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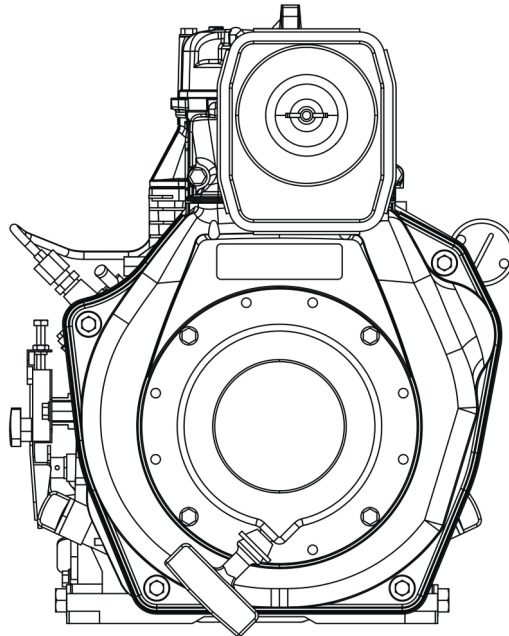
***TM 9-2815-257-23
TO 38G1-128-4
TM 10155A/2815-23/3**

TECHNICAL MANUAL

FIELD MAINTENANCE MANUAL

FOR

**DIESEL ENGINE ASSEMBLY
L70AE-DEGFR (NSN 2815-01-465-5993) (EIC N/A)
L70N6EZ0T9EAFD (NSN 2815-01-660-5994) (EIC N/A)**



*** SUPERSEDEURE NOTICE** - TM 9-2815-257-23, TO 38G1-128-4, and TM 10155A/2815-23/3, supersedes TM 9-2815-257-24 dated 1 November 2000, including all changes. Date of issue for the revised manual is: 31 August 2018.

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**HEADQUARTERS, DEPARTMENT OF THE
ARMY, AIR FORCE AND MARINE CORPS
31 AUGUST 2018**

PCN 182 101550 00

WARNING SUMMARY

FIRST AID

For First Aid information, refer to TC 4-02.1.

5

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1

DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2

IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3

IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

4

SEND FOR HELP AS SOON AS POSSIBLE

5

AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNING AND CAUTION STATEMENTS

This section provides a summary of all critical safety information in this manual. It includes a list of all WARNINGS in work package procedures. Warnings on the same subject are grouped by topic. Only those WARNINGS that pertain to a specific maintenance procedure will be listed under each WARNING heading in a work package.

Prior to starting any work package procedure, all WARNINGS included in the initial setup and text for that work package must be reviewed, understood and followed. Review to the MATERIALS/PARTS in the INITIAL SETUP of the work package for any hazardous materials used during maintenance of the equipment. Then, refer to the detailed WARNINGS for hazardous materials.

Operation and maintenance of the generator set contains many possibilities for injury or death to personnel. Be sure to be familiar with general first aid procedures as referenced in TC 4-02.1, First Aid.

GENERAL HAZARDOUS MATERIALS WARNINGS

Hazardous materials are not to be used by the operator in the operation and maintenance of the generator set.

Engine exhaust fumes contain deadly poisonous gases.

WARNING SUMMARY – CONTINUED

Severe exposure can cause death of permanent brain damage.

Exhaust gases are most dangerous in places with poor airflow. The best defense against exhaust gas poisoning is very good air flow.

To protect yourself and others, always obey the following rules:

- Do not run engine indoors unless you have very good airflow.
- Do not idle engine for a long time unless there is a very good airflow.
- Be alert at all times. Check for smell of exhaust fumes.
- Reminder: The best defense against exhaust gas poisoning is very good air flow.

Exhaust gas poisoning causes dizziness, headache, loss of muscle control, sleepiness, coma, and death. If anyone shows signs of exhaust gas poisoning, get all personnel clear of the generator set. Make sure they have lots of fresh air. Keep them warm, calm, and inactive. Get medical help. If anyone stops breathing, give artificial respiration.

GENERAL ELECTRICAL SAFETY WARNINGS

Energized troubleshooting and work is authorized for this equipment by qualified personnel, in accordance with the conditions and instructions contained in this technical manual below::

- Limited Approach Boundary: 1.0 m (3 ft. 6 in.) Unqualified personnel are not permitted within 1.0 m (3 ft. 6 in.) of the equipment when energized parts are exposed.
- Restricted Approach Boundary: Avoid contact. Personal contact with energized parts is not permitted.
- Arc flash boundary: There is no arc flash hazard for this equipment when following the authorized maintenance procedures.
- Job briefing: Personnel must review and understand each work package with attention to the precautions and hazards involved. Work within the limited approach boundary involves energized parts at 240 VAC and 28 VDC with high current sources.
- Multiple DC power sources for this equipment are present, batteries and external supply (NATO slave connector).
- Personal Protective Equipment (PPE): Safety glasses are required during work where energized parts are exposed. Conductive jewelry (rings, watches, necklaces, etc.) must be removed before energized work is conducted on this equipment.

FOR ARTIFICIAL RESPIRATION, REFER TO TC 4-02.1.

WARNING

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING SUMMARY – CONTINUED

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

The engine is heavy. Personnel should not lift the engine manually rather provide adequate lifting device to support the weight. Use lifting ring for lifting purpose and use caution when lifting or moving the engine assembly. Failure to observe this warning can result in injury to personnel and/or damage to equipment.

WARNING

With any access door open, the noise level of the generator set when operating could cause hearing damage. US Army approved hearing protection must be worn when working near the generator set while running.

WARNING

Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

WARNING

Wash hands or wear gloves when handling corroded battery terminals. Corrosion from battery terminal could injure skin. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

LIST OF EFFECTIVE PAGES / WORK PACKAGES

NOTE: SUPERSEDURE NOTICE - TM 9-2815-257-23, TO 38G1-128-4, and TM 10155A/2815-23/3, superseded TM 9-2815-257-24 dated 1 November 2000, including all changes. Date of issue for the revised manual is: 31 August 2018. Zero in the "Change No." column indicates an original page or work package.

Date of issue for the original manual is:

Original

31 August 2018

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 17 AND TOTAL NUMBER OF WORK PACKAGES IS 25, CONSISTING OF THE FOLLOWING:

Page / WP No.	Change No.	Page / WP No.	Change No.
Front cover	0	Back cover	0
Blank	0		
Warning summary (3 pgs)	0		
i - viii	0		
Chp 1 title page	0		
Blank	0		
WP 0001 (8 pgs)	0		
WP 0002 (6 pgs)	0		
WP 0003 (6 pgs)	0		
Chp 2 title page	0		
Blank	0		
WP 0004 (2 pgs)	0		
WP 0005 (8 pgs)	0		
Chp 3 title page	0		
Blank	0		
WP 0006 (4 pgs)	0		
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WP 0008 (6 pgs)	0		
WP 0009 (2 pgs)	0		
WP 0010 (4 pgs)	0		
WP 0011 (4 pgs)	0		
WP 0012 (4 pgs)	0		
WP 0013 (4 pgs)	0		
WP 0014 (6 pgs)	0		
WP 0015 (8 pgs)	0		
WP 0016 (4 pgs)	0		
WP 0017 (6 pgs)	0		
WP 0018 (4 pgs)	0		
WP 0019 (4 pgs)	0		
Chp 4 title page	0		
Blank	0		
WP 0020 (2 pgs)	0		
WP 0021 (4 pgs)	0		
WP 0022 (4 pgs)	0		
WP 0023 (2 pgs)	0		
WP 0024 (2 pgs)	0		
WP 0025 (2 pgs)	0		
Inside back cover	0		

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DEPARTMENT OF THE ARMY, AIR FORCE AND MARINE CORPS
Washington, D.C., 31 AUGUST 2018

TECHNICAL MANUAL

FIELD MAINTENANCE MANUAL
FOR

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Reports, as applicable by the requiring Service, should be submitted as follows:

- (a) (A) Army - Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual, directly to: Commander, U.S. Army Communications-Electronics Command, 6565 Surveillance Loop, Building 6001, Aberdeen Proving Ground, MD 21005-1846. You may also send in your recommended changes via electronic mail or by fax. Our fax number is 443-861-5498, DSN 848-5498. Our e-mail address is usarmy.APG.cecom.mbx.amsel-lc-leo-pubs-chg@mail.mil. Our online web address for entering and submitting DA Form 2028s is <https://cecom.aep.army.mil/cecom/LRC/Web-Pages/DAForm2028.aspx>.
- (b) (MC) Marine Corps - Submit notice of discrepancies or suggest changes on a NAVMC 10772. The NAVMC may be submitted using either of the following:
 - a. The preferred method of submittal is using <https://portal.logcom.usmc.mil/sites/pubs> URL which will allow direct entry to the LOGCOM SharePoint Pubs site (LOGCOM SharePoint access and CAC required) where the form (Part I or Part II) can be filled out and submitted to the NAVMC database. Problems or questions regarding the NAVMC 10772 program should be reported by calling DSN 567-7628 or DSN 567-5017 (Commercial number is (229) 639-7628 or (229) 639-5017).
 - b. The alternate method of submittal does not require a Common Access Card (CAC) to access the form. Click on <https://navalforms.documentservices.dla.mil/web/public/home>, click "FORMS", select the "Keyword Search" button, enter "10772" in the Search Criteria Box. Under "type" click on download page button. Click on PDF icon. Enter user data in the appropriate fields. Must have users contact information block filled with Unit address and telephone number. Click on the "Envelope" icon in the tool bar. Select "Send Copy", click on "OK". When the PDF document is created, an Outlook Email screen will open with the .PDF as an attachment. On the TO: line type SMB.LOG.Tech.Pubs.fct@usmc.mil. In the body of the email, type any additional information you wish to provide. Click "SEND".
- (c) (F) Air Force - By Air Force AFTO Form 22 (Technical Manual (TM) Change Recommendation and Reply) in accordance with TO 00-5-1-WA-1.
A reply will be furnished to you.

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HOW TO USE THIS MANUAL

This manual provides troubleshooting, maintenance, and supporting information required to maintain the Diesel Engine Assembly Model L70AE-DEGFR and model L70N6EZ0T9EAFD. Listed below are some of the features included in this Technical Manual (TM) to help locate and use the provided information.

WORK PACKAGE ORGANIZATION

This TM has been organized using the Work Package (WP) format. Each chapter contains a series of WPs rather than sections and paragraphs. Each WP is designed to stand alone as a complete information module; if the user keeps the section(s) of this TM in a loose-leaf binder, the user will be able to remove just the WP needed to complete a specific task. Here are some WP features of which the user should be aware.

Each WP is numbered using a four-digit number beginning with WP 0001. WPs are numbered sequentially throughout the TM (ex. WP 0016, WP 0020, etc.). The Table of Contents lists each chapter and WP title as well as all figures and tables contained within each. Figures and tables are numbered sequentially for each WP.

The WP number is located at the top right of each page. It is also located at the bottom of the page with the WP page number included (0001-1 would be page 1 of the General Information WP (WP 0001, General Information)).

Each WP starts on a right-hand page. This is done so the user can remove a single WP from the paper TM if needed for a task. Blank pages are assigned a number, but it appears on the preceding or following page. For example, if page 0001-10 of a WP is blank, page 0001-9 will have the number 0001-9/10 blank; or if page 0001-1 of a WP is blank, page 0001-2 will have the number 0001-1 blank/2.

Each task containing step-by-step maintenance or troubleshooting procedures will end with the words END OF TASK, and each WP ends with the statement END OF WORK PACKAGE. Think of each WP as a small, stand-alone TM.

SUPPORTING INFORMATION

The supporting information in this manual contains both general maintenance information and specific data for this engine. The WPs list reference manuals and materials, components of the engine assembly, additional authorization list items, expendable supplies and materials, and mandatory replacement parts. Refer to the Table of Contents (page ii) for a complete list of supporting information used in this manual.

Warnings, Cautions and Notes Definitions

Warnings, cautions, notes, chapter titles, and paragraph headings are printed in bold type.

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this publication. Warning, cautions, and notes provide supplemental information. Personnel must understand and apply these warnings, cautions, and notes during many phases of operation and maintenance to ensure personnel safety and health and the protection of property. Portions of this information may be repeated in certain chapters of this publication for emphasis.

WARNING

A warning identifies a clear danger to the person doing that procedure.

CAUTION

A caution identifies a risk of damage to equipment.

NOTE

A note highlights essential procedures, conditions, or statements or conveys important instructional data to the user.

HOW TO USE THIS MANUAL – CONTINUED

CHAPTER OVERVIEW

Chapter 1 - General Information, Equipment Description, and Theory of Operation

Chapter 1 provides an introduction to the Diesel Engine Assembly. It is divided into three WPs, as follows:

General Information. This WP provides general information about this manual and the related forms and records. Instructions are provided for making engine improvement recommendations. Coverage includes a reference to the TM that contains instructions on destruction of materiel to prevent enemy use. Also, a nomenclature cross-reference list is provided as well as a list of abbreviations and acronyms.

Equipment Description and Data. This WP describes capabilities, characteristics, and features. It provides basic equipment data and shows the locations of major components. Descriptions of the major components are also provided.

Theory of Operation. This WP provides the maintainer with adequate background information to support and perform maintenance tasks and troubleshooting on the engine assembly.

Chapter 2 - Field Troubleshooting Procedures

Chapter 2 covers troubleshooting procedures of the Diesel Engine Assembly to be performed by field level maintenance. The chapter is divided as follows:

Field Troubleshooting Index. This WP provides a troubleshooting introduction and malfunction/symptom index to direct you to the appropriate troubleshooting procedure at the field maintenance level.

Field Troubleshooting Procedures. This WP covers troubleshooting procedures and corrective actions that are to be performed at the field maintenance level.

Chapter 3 - Field Maintenance Instructions

Chapter 3 provides instructions covering the Diesel Engine Assembly maintenance that must be performed at field level. The chapter is divided as follows:

Service Upon Receipt. This WP contains instructions for inspecting and servicing the equipment when it is received. It includes instructions for unpacking the engine when it is received. The instructions also include unpacking and stowing the basic issue items that accompany the Diesel Engine Assembly. Also included are instructions on positioning the equipment for operation and connecting an external fuel source.

Field Preventive Maintenance Checks and Services (PMCS) Introduction. This WP provides a detailed explanation of each table entry in the PMCS table along with applicable warnings, cautions, and notes prior to starting on the PMCS procedures.

Field PMCS, Including Lubrication Instructions. This WP contains instructions covering the PMCS that must be performed at the field maintenance level. A table provides information on maintenance intervals and actions required. This WP also lists the applicable references that contain lubrication instructions for your equipment.

Field Maintenance Procedures. These WPs list the applicable references that cover field maintenance of the engine.

Torque Limits. This WP lists standard torque values for bolts and screws used in maintaining the engine.

Chapter 4 - Supporting Information

The chapter is divided as follows:

References. This WP lists all publications referenced in the various chapters of the TM. The listing includes the title and document number of each publication.

Introduction for Standard Two-Level Maintenance Allocation Chart (MAC). This WP explains what is covered in the MAC.

Standard Two-Level MAC. This MAC has three sections, as follows:

HOW TO USE THIS MANUAL – CONTINUED

Maintenance Allocation Chart (MAC). Table 1 contains a tabular listing that assigns maintenance functions to specific maintenance levels. It lists the work time needed to perform each maintenance function at the assigned level. It also contains a column that has entries keyed to the tools and equipment listed in Table 2.

Another column has entries keyed to the remarks in Table 3.

Tool and Test Equipment Requirements. Table 2 contains complete identification information for the items referenced in the tools and equipment column of Table 1.

Remarks. Table 3 provides additional information for each entry in the remarks column of Table 1.

Components of End Item (COEI) and Basic Issue Items (BII) Lists. This WP lists the items usually packaged separately but needed for installation and operation of the equipment. The WP has three sections, as follows:

Introduction. This section explains the entries in Tables 1 and 2.

Components of End Item. The equipment is normally shipped fully assembled, so this section is not applicable.

Basic Issue Items. This section contains a list of the accessories needed for installation and operation of the equipment.

Additional Authorization List (AAL). This WP lists additional items you are authorized for support of the equipment. This WP contains two sections, as follows:

Introduction. This section explains the entries in Tables 1.

Additional Authorized Items List. This table lists the Additional Authorized Items.

Expendable and Durable Items List. This WP lists expendable/durable supplies and materials needed to operate and maintain your equipment. The WP contains two sections, as follows:

Introduction. This section explains the entries in Table 1.

Expendable and Durable Items List. The list indicates the maintenance level that needs each item and identifies the items by National Stock Number (NSN), description, and unit of measure.

HOW TO FIX AN EQUIPMENT MALFUNCTION

Determining the Cause

Figuring out the cause of the malfunction, or troubleshooting, is the first step in fixing the engine assembly and returning it to operation. Follow these steps to determine the root of your problem:

1. Turn to the Table of Contents in this manual.
2. Locate "Troubleshooting" and turn to the page indicated.
3. In the Troubleshooting section, find the troubleshooting symptom for the component affected by the malfunction. Refer to the Symptom Index for help.
4. If the specific symptom is not addressed, the maintenance required is most likely more detailed than authorized for your level. Notify personnel at a higher maintenance level.
5. Begin troubleshooting. Carefully work your way down through the troubleshooting table to try and determine what the problem is.
6. Once the trouble has been determined, go to the maintenance task called out. Remedy the malfunction, test the engine, and return it to service.

HOW TO USE THIS MANUAL – CONTINUED

Preparing for a Task

Be sure that you understand the entire maintenance procedure before beginning any maintenance task. Make sure that all parts, materials, and tools are handy. Read all steps before beginning.

Prepare to do the task as follows:

1. Carefully read the entire task before starting. It tells you what you will need and what you have to know to start the task. **DO NOT START THE TASK UNTIL:**
 - a. You know what is needed
 - b. You have everything you need
 - c. You understand what to do
2. **PAY ATTENTION TO WARNINGS, CAUTIONS, AND NOTES.**
3. Maintenance tasks are arranged in a logical disassembly/assembly sequence and address only the component or assembly to be replaced. Locator illustrations are included for removal and installation. These illustrations show you the area of the engine to be worked on.
4. All mandatory replacement parts are listed, including gaskets, packings, cotter pins, and lockwashers. They are listed by the Repair Parts and Special Tools List (RPSTL) name. Expendable supplies and support materials are listed, including solvents, rags, grease, and safety wire.
5. If expendable/durable supplies or materials are needed, get them before starting the task. Refer to WP 0023 for the correct nomenclature and NSN.
6. Tools, tool kits, or shop sets needed to do the task are listed. If tools from a repairman's kit are needed, the kit is listed. Tools that are not in a kit or set are listed by name, type, and size. Special tools and test equipment are listed by part number.
7. Related TMs needed to accomplish the task are listed. The steps tell when these TMs are needed.

How to Do the Task

Before starting, read the entire task. Familiarize yourself with the entire procedure before you begin the task. The following are considered standard maintenance practices. Instructions about these practices will not normally be included in the task steps. Task steps will tell you when standard maintenance practices do not apply. As you read, remember the following:

1. **PAY ATTENTION TO WARNINGS, CAUTIONS, AND NOTES.**
2. Electrical wiring must be tagged before it is disconnected.
3. Used packings, retainers, gaskets, cotter pins, lockwashers, and safety wire shall be discarded unless the nuts and bolts are held captive. Do not reuse. New parts shall be installed.
4. Packings shall be coated with lubricant before installation in accordance with task instructions.
5. Disassembly procedures list all steps required to support total authorized repair of a component. You may not need to disassemble a part as far as described in the task. Follow the steps to disassemble as far as required to replace worn or damaged parts.
6. Before components or the disassembled parts of a component are inspected, they must be cleaned as required.
7. Components and mating surface areas must be inspected for serviceable condition before installation.

HOW TO USE THIS MANUAL – CONTINUED

8. When a nut is tightened or loosened on a bolt, the bolt head must be held with a wrench unless the nuts and bolts are held captive.
9. A special torque will be cited when the words TORQUE TO are used in the task. Standard torques are used at all other times. Refer to WP 0019 for Torque Limits information.
10. When tightening hardware, observe compliance with the drag torque as required. Refer to WP 0019 for Torque Limits information. To determine drag torque, thread nut onto bolt until at least two threads protrude. The nut must not contact the mating part. The torque required to begin turning the nut is the drag torque.
11. When a cotter pin is required, cotter pin holes will be aligned within the allowable torque range.
12. After maintenance, inspect for foreign objects.

Remember, this manual is divided by maintenance level (field and sustainment). If you cannot find an engine malfunction in the troubleshooting section for your maintenance level, or cannot find the appropriate corrective actions in the maintenance section, notify personnel at a higher maintenance level.

REPAIR PARTS AND SPECIAL TOOLS LIST

Refer to TM 9-2815-257-24P for the Engine Assembly RPSTL. The RPSTL contains exploded view illustrations and parts lists keyed to the illustrations. It lists part number, part name, and quantity used in each application. Use the RPSTL to identify and order replacement parts.

CHAPTER 1

FIELD MAINTENANCE MANUAL GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION

GENERAL INFORMATION

SCOPE

This manual provides field maintenance instructions on troubleshooting and maintenance of the Diesel Engine Assembly, Model Number L70AE-DEGFR, NSN 2815-01-465-5993, and Model Number L70N6EZ0T9EAFD, NSN 2815-01-660-5994, manufactured by Yanmar Diesel Engine Company, Ltd. Information is provided on preventive maintenance checks and services, lubrication, troubleshooting, and maintenance. Refer to Figure 1 for full view illustrations of the Diesel Engine Assembly.

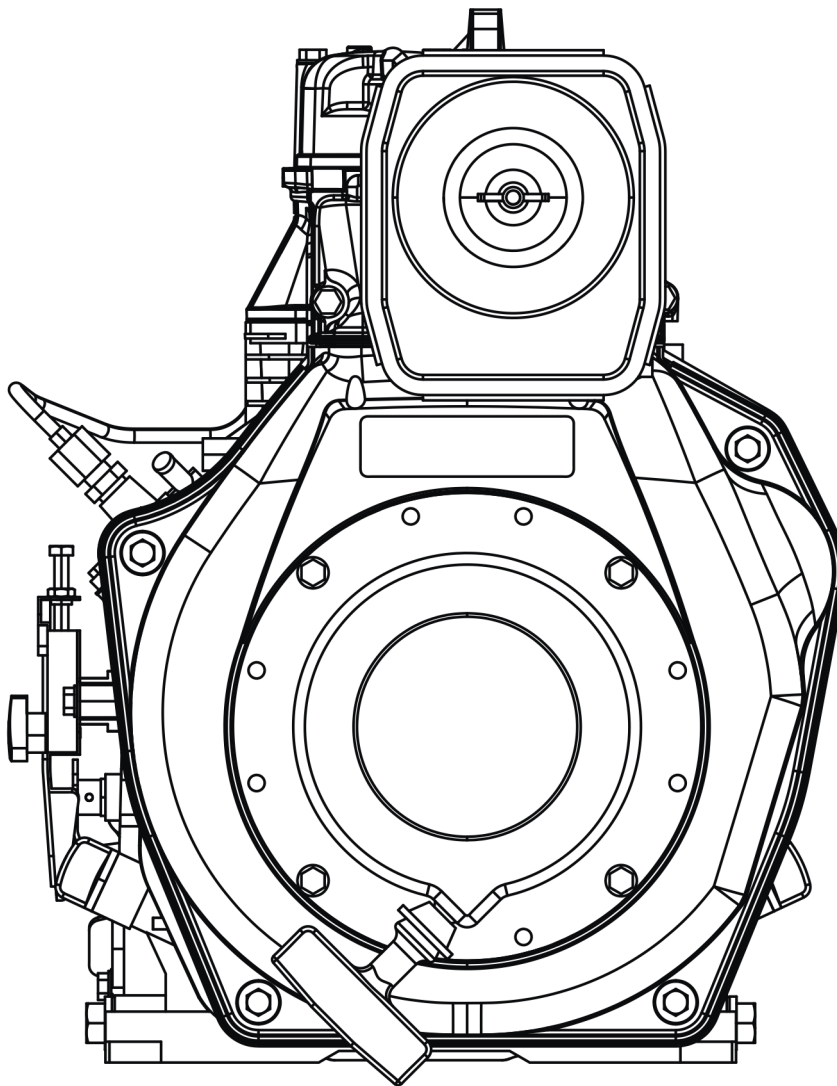


Figure 1. Diesel Engine Assembly.

MAINTENANCE FORMS, RECORDS, AND REPORTS

- (1) (A) Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual; DA PAM 738-751, Functional Users Manual for the Army Maintenance Management Systems - Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.
- (2) (MC) Maintenance forms and records used by Marine Corps personnel are prescribed by TM 4700-15/1.
- (3) (F) Maintenance forms and records used by Air Force personnel are prescribed in AFI 21-101 and the applicable TO 00-20 Series Technical Orders.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

(A) If your equipment needs improvement, let us know. Send us an Equipment Improvement Recommendation (EIR). Only you, the user, can tell us what you don't like about your equipment. Let us know how we can improve the design or performance. If you have Internet access, the easiest and fastest way to report problems or suggestions is to send us a Product Quality Deficiency Report (PQDR).

If you have a user's account, you can submit a PQDR for warranty, EIR, and quality deficiency related issues on ALL CECOM (B16) owned equipment (including B16 Aviation related). Please visit the Product Data Reporting and Evaluation (PDREP) website at https://www.pdrep.csd.disa.mil/pdrep_files/accessforms/useraccess.htm to submit a PQDR, request a new account, or input a PQDR via the EZ PDR function, if you do not have an account.

CECOM (B16) aviation related PQDRs will not go to AMCOM's Joint Deficiency Reporting System (JDRS). If AMCOM should get a CECOM aviation PQDR, they will re-direct it to the CECOM PQDR Team.

If you have questions or need assistance submitting a report, please email the CECOM PQDR Team at usarmy.apg.cecom.mbx.lrc-leo-b16-pqdr-support-team@mail.mil. If any additional information is needed, we will send you a reply.

(F) Air Force personnel are encouraged to submit EIR's in accordance with AFI 38-401.

(MC) For Marine Corps users: Quality deficiency reports (QDR) shall be submitted on SF 368 in accordance with MCO 4855.10. A reply will be furnished to you.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking.

Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking.

SF Form 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

For destruction of Army materiel to prevent enemy use, see TM 750-244-3.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE – CONTINUED

Destruction of Air Force materiel to prevent enemy use shall be IAW AFI 33-201.

Destruction of Marine Corps materiel to prevent enemy use shall be IAW MC direction.

DEMOLITION OF MARINE CORPS MATERIEL TO PREVENT ENEMY USE

Demolition to Render the Generator Set Inoperative

1. When capture or abandonment of the generator set to an enemy is imminent. The responsible unit commander must make the decision to either destroy or render the equipment inoperative.
2. Based on this decision, orders are issued which cover the desired extent of destruction.
 - a. Operators should be thoroughly familiar with all methods of destruction without referencing any particular manual.
 - b. Demolition of the generator set can be accomplished by explosives, fire, or tools such as a sledge hammer, pick, or ax. Demolition can also be accomplished by misuse.
3. The method used will depend on the time available and the availability of these materials in the vicinity of the generator set.
4. Demolition by mechanical means.
 - a. Use hammer, pick, ax, or any other available tool to destroy vital engine and control parts.
 - b. Control box, fuel injection lines, and the radiator should be smashed, engine and control box wires should be pulled and cut, and any other external engine components (fuel filter, alternator) should be damaged enough to make them inoperable.
5. Demolition by misuse.
 - a. Drain diesel generator crankcase oil.
 - b. Block diesel generator engine air supply ports.
 - c. Start diesel generator engine and allow it to operate until it fails.
 - d. Switch Battleshort into the ON position.
 - e. Pour sand, dirt, or other available abrasive compound in all exposed surfaces and access ports of the diesel engine and generator.
 - f. Drain engine coolant.
6. Demolition by burning. Complete as much mechanical damage as possible, and then saturate unit with flammable fuel and ignite.
7. Demolition by explosives. Place explosive charges in priority order (Table 2).

Table 1. Demolition Priority Levels.

PRIORITY LEVEL	COMPONENT	EXPLOSIVE CHARGE REQUIRED
1	Generator Engine	1 lb (0.45 kilograms (kg))
2	Control Box	1 lb (0.45 kg)
3	Generator Housing	1 lb (0.45 kg)
4	Housing/Structure	2 lb (0.90 kg)

PREPARATION FOR STORAGE OR SHIPMENT

ADMINISTRATIVE STORAGE

Administrative storage or equipment issued to and used by Army activities will have Preventive Maintenance Checks and Services (PMCS) performed before storing. When removing the equipment from administrative storage, the PMCS checks should be performed to assure operational readiness.

Administrative storage shall be in accordance with AR 750-1.

PREPARATION FOR STORAGE OR SHIPMENT – CONTINUED**GENERAL**

This section provides instructions for short term and immediate storage, or shipment, of the engine assembly.

SHORT TERM STORAGE (30 days or less)

- a. Check engine oil level and service as required.
- b. Cap all disconnected fuel lines.
- c. Conduct a general inspection of the engine assembly to ensure all components are present and securely fastened.
- d. Store the engine on a level surface in an area protected from the elements. Cover as required depending upon weather conditions.

INTERMEDIATE TERM STORAGE (more than 30 days)

- a. Start the engine and allow it to operate for 3 minutes. Shut down engine.
- b. Drain engine oil while engine is still warm in accordance with WP 0006.
- c. Fill engine crankcase with fresh oil in accordance with WP 0006.
- d. Remove head cover (WP 0014). Add 2 cubic centimeters (cc) of engine oil to the cylinder head, then reinstall head cover.
- e. Locate decompression lever (WP 0003, Figure 2, Item 1) on head cover. Push decompression lever down and hold in position while you pull the recoil starter handle 3 times. Do not pull hard enough to start engine.
- f. Pull decompression lever up. Slowly pull the recoil starter handle until it feels tight. This closes the intake and exhaust valves in compression position and helps prevent rust from forming.
- g. Conduct a general inspection of the engine assembly to ensure all components are present and securely fastened.
- h. Store the engine on a level surface in an area protected from the elements. Cover as required depending upon weather conditions.

SHIPMENT

- a. Prepare engine for short or intermediate term storage, as applicable.
- b. Attach all forms, tags, and records to engine assembly.
- c. Mark for shipment in accordance with MIL-STD-129R.

WARRANTY INFORMATION

This section provides information on manufacturer's warranties for engine assembly components. The warranty period begins on the date of end item shipment to the government, as defined by the warranty date on the end item data plate, unless otherwise noted in Table 1.

Warranty service may be obtained with two methods. 1) Warranty service can be obtained by contacting the actual warranted component manufacturer listed in column 1. Each manufacturer will provide instructions on filing a claim. 2) Fill out a warranty claim per DA PAM 738-750. The preferred warranty claim form is the SF 368, Product Quality Deficiency Report. The DA Form 2407, Maintenance Request, is also acceptable.

WARRANTY INFORMATION – CONTINUED

Troubleshooting should be performed to the level of warranted component, but no further. Troubleshooting to the failed part inside warranted components may invalidate the warranty.

If you have difficulty with or questions about the warranty process, contact your local CECOM LAR or the CECOM Generator Branch, DSN 992-1313, (732) 532-1313.

Table 2. Manufacturer's Warranties.

(1) MANUFACTURER	(2) COMPONENT UNDER WARRANTY	(3) WARRANTY PERIOD
Yanmar Diesel America Corp Mack Boring and Parts Company 2365 Route 22 West Union, NJ 07083 Phone: 908-964-0700 Fax: 908-964-8475 Email: sales@mackboring.com CAGE: S4163	Diesel Engine Assembly, Model L70AE-DEGFR, NSN 2815-01-465-5993 Diesel Engine Assembly, Model L70N6EZ0T9EAFD, NSN 2815-01-660-5994	1 Year

NOMENCLATURE CROSS-REFERENCE LIST

Shortened nomenclature is used in this manual to make procedures easier for you to read. A cross-reference between the shortened nomenclature and the official nomenclature is shown below.

Common Name**Official Nomenclature**

Engine

Diesel Engine Assembly, Model L70AE-DEGFR and Model L70N6EZ0T9EAFD

LIST OF ABBREVIATIONS/ACRONYMS**Abbreviation****Definition**

AAL

Additional Authorization List

BII

Basic Issue Item

CAGE

Commercial and Government Entity

CAGEC

Commercial and Government Entity Code

COEI

Components of End Item

CPC

Corrosion Prevention and Control

CPI

Continuous Process Improvement

CTA

Common Table of Allowance

EIR

Equipment Improvement Recommendation

HP

horsepower

LIST OF ABBREVIATIONS/ACRONYMS – CONTINUED

ID	inside diameter
JDRS	Joint Deficiency Reporting System
MAC	Maintenance Allocation Chart
MTOE	Modification Table of Organization and Equipment
NO	Number
NSN	National Stock Number
N•m	Newton Meter
OD	outside diameter
PDREP	Product Data Reporting and Evaluation
PMCS	Preventive Maintenance Checks and Services
PQDR	Product Quality Deficiency Report
QDR	Quality Deficiency Report
QTY	Quantity
RPM	Revolutions Per Minute
RPSTL	Repair Parts and Special Tools List
SMR	Source, Maintenance and Recoverability
TAMMS	The Army Maintenance Management System
TDC	Top Dead Center
TMDE	Test, Measurement and Diagnostic Equipment
VDC	Volts Direct Current
ft-lb	foot-pounds
kg-cm	kilogram-centimeters
mm	millimeter
psi	pounds per square inch
°C	Degrees Celsius
°F	Degree Fahrenheit

QUALITY OF MATERIAL

Material used for replacement , repair, or modification must meet the requirements of this TM 9-2815-257-23. If quality of material requirements are not stated in this TM 9-2815-257-23, the material must meet the requirements of the drawings, standards, specifications, or approved engineering change proposals applicable to the subject equipment.

SUPPORTING INFORMATION FOR REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT**Special Tools, TMDE, and Support Equipment**

Refer to TM 9-2815-257-24P for complete data on special tools and equipment required for engine assembly maintenance. Refer to the Maintenance Allocation Chart (MAC), WP 0022, for special tools and equipment used at the field maintenance level.

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, or CTA 8-100, as applicable to your unit.

Repair Parts

- a. Refer to WP 0025 for a list of Mandatory Replacement Parts required for field level maintenance of the engine assembly.
- b. Repair parts are listed and illustrated in TM 9-2815-257-24P.

END OF WORK PACKAGE

EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**Characteristics**

- Single cylinder, direct injection, four-stroke cycle diesel engine
- Air cooled via flywheel fan
- Self-contained lubricating oil and fuel systems
- Engine crankcase acts as oil sump, no separate oil pan
- Equipped with a 24 Volts Direct Current (VDC) starter motor
- Rope pull recoil starter system allows for manual start

Capabilities and Features

- 3000 to 3600 Rotations Per Minute (RPM) operating speed
- Rated engine horsepower (HP) of 6.7 HP at 3600 RPM
- Mechanical governor set for 3750 RPM maximum
- Weight: 86 pounds (39 kilograms)
- Dimensions: 15.08 x 16.58 x 17.72 inches (38.3 x 42.1 x 45.0 centimeters)

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS MODEL L70N6EZ0T9EAFD

Figure 1 shows the location of the major components of the engine Model L70N6EZ0T9EAFD, NSN 2815-01-660-5994. Table 1 provides a short description of major components Model L70N6EZ0T9EAFD, NSN 2815-01-660-5994.

- a. The Diesel Engine Assembly Model L70N6EZ0T9EAFD, NSN 2815-01-660-5994, hereafter referred to as the engine, is a single cylinder, air cooled, direct injection, four-stroke cycle, diesel engine. The engine is designed to operate between 3000 and 3600 RPM, with an output of 6.7 HP at 3600 RPM.
- b. The engine has self-contained oil lubrication and fuel systems. It is equipped with an air filter and housing (Figure 1, Item 2), 24 VDC starter motor (Figure 1, Item 3), engine oil filter (Figure 1, Item 9), oil fill cap and gauge (Figure 1, Item 10), fuel injection pump (Figure 1, Item 1), and fuel injector (Figure 1, Item 4). A recoil starter system (Figure 1, Item 8) permits manual start of the engine without a battery. All components are housed in or attached to an engine block (Figure 1, Item 6).
- c. A mechanical governor (Figure 1, Item 11) mounted on the left side of the engine is set for 3750 RPM, maximum. In generator set applications, an electrical actuator connected to the governor lever (Figure 1, Item 12) controls the governor and allows for variable speed operation.
- d. Engine cooling is provided by a flywheel fan (Figure 1, Item 7) connected to the crankshaft (Figure 1, Item 5). The fan forces air over the cylinder fins and engine components. The fan is completely guarded by a cover to prevent inadvertent contact during operation.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS MODEL L70N6EZ0T9EAFD – CONTINUED

Major Components Of Engine Assembly Model L70N6EZ0T9EAFD

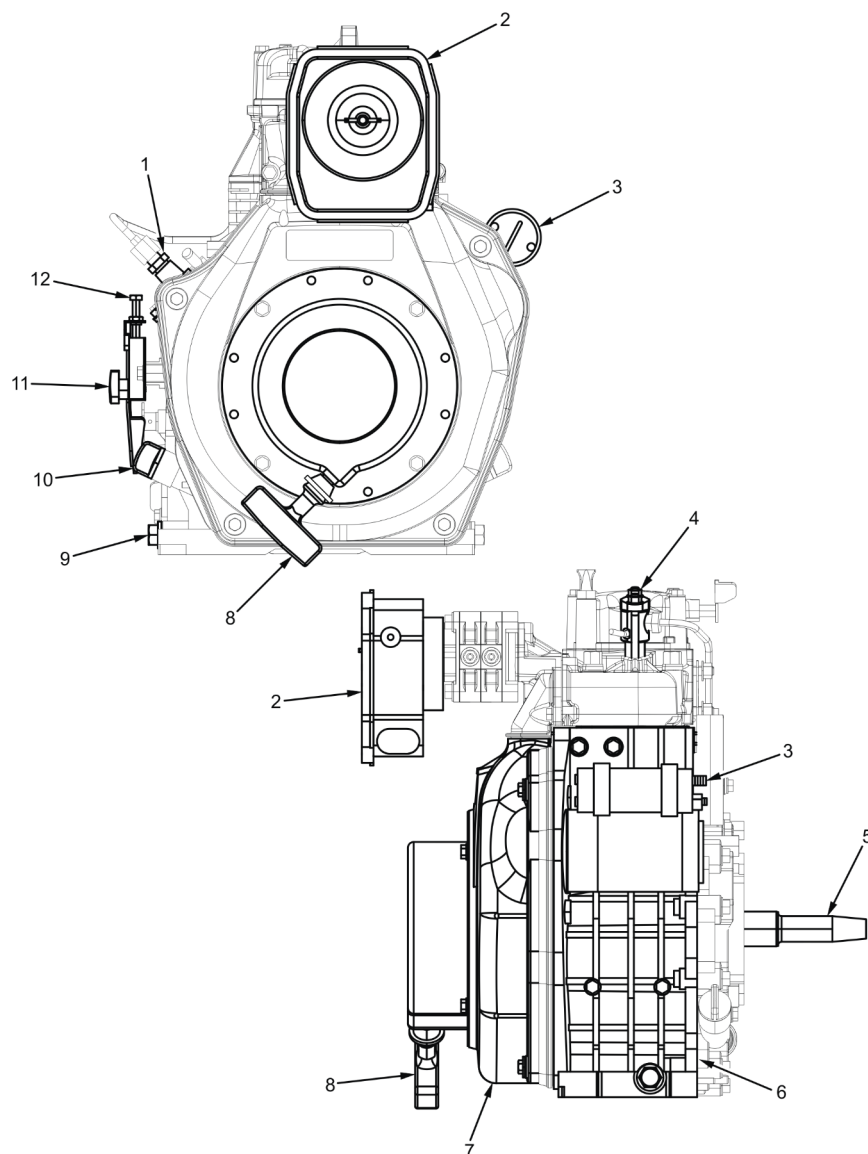


Figure 1. Location Of Engine Assembly Components Model L70N6EZ0T9EAFD.

Table 1. Location Of Engine Assembly Components Model L70N6EZ0T9EAFD.

ITEM NO.	ITEM NAME
1	Fuel Injection Pump
2	Air Filter and Housing
3	24 VDC Starter Motor
4	Fuel Injector
5	Crankshaft

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS MODEL L70N6EZ0T9EAFD – CONTINUED**Table 1. Location Of Engine Assembly Components Model L70N6EZ0T9EAFD. – Continued**

ITEM NO.	ITEM NAME
6	Engine Block
7	Flywheel Housing
8	Recoil Start System
9	Engine Oil Filter
10	Oil Fill Cap and Gauge
11	Mechanical Governor
12	Governor Lever

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS MODEL L70AE-DEGFR

Figure 2 shows the location of the major components of the engine. Table 2 provides a short description of major components.

- a. The Diesel Engine Assembly, Model L70AE-DEGFR, NSN 2815-01-465-5993, hereafter referred to as the engine, is a single cylinder, air cooled, direct injection, four-stroke cycle, diesel engine. The engine is designed to operate between 3000 and 3600 RPM, with an output of 6.7 HP at 3600 RPM.
- b. The engine has self-contained oil lubrication and fuel systems. It is equipped with an air filter and housing (Figure 2, Item 2), 24 VDC starter motor (Figure 2, Item 3), engine oil filter (Figure 2, Item 9), oil fill cap and gauge (Figure 2, Item 10), fuel injection pump (Figure 2, Item 1), and fuel injector (Figure 2, Item 4). A recoil starter system (Figure 2, Item 8) permits manual start of the engine without a battery. All components are housed in or attached to an engine block (Figure 2, Item 6).
- c. A mechanical governor (Figure 2, Item 11) mounted on the left side of the engine is set for 3750 RPM, maximum. In generator set applications, an electrical actuator connected to the governor lever (Figure 2, Item 12) controls the governor and allows for variable speed operation.
- d. Engine cooling is provided by a flywheel fan (Figure 2, Item 7) connected to the crankshaft (Figure 2, Item 5). The fan forces air over the cylinder fins and engine components. The fan is completely guarded by a cover to prevent inadvertent contact during operation.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS MODEL L70AE-DEGFR – CONTINUED

Major Components Of Engine Assembly Model L70AE-DEGFR

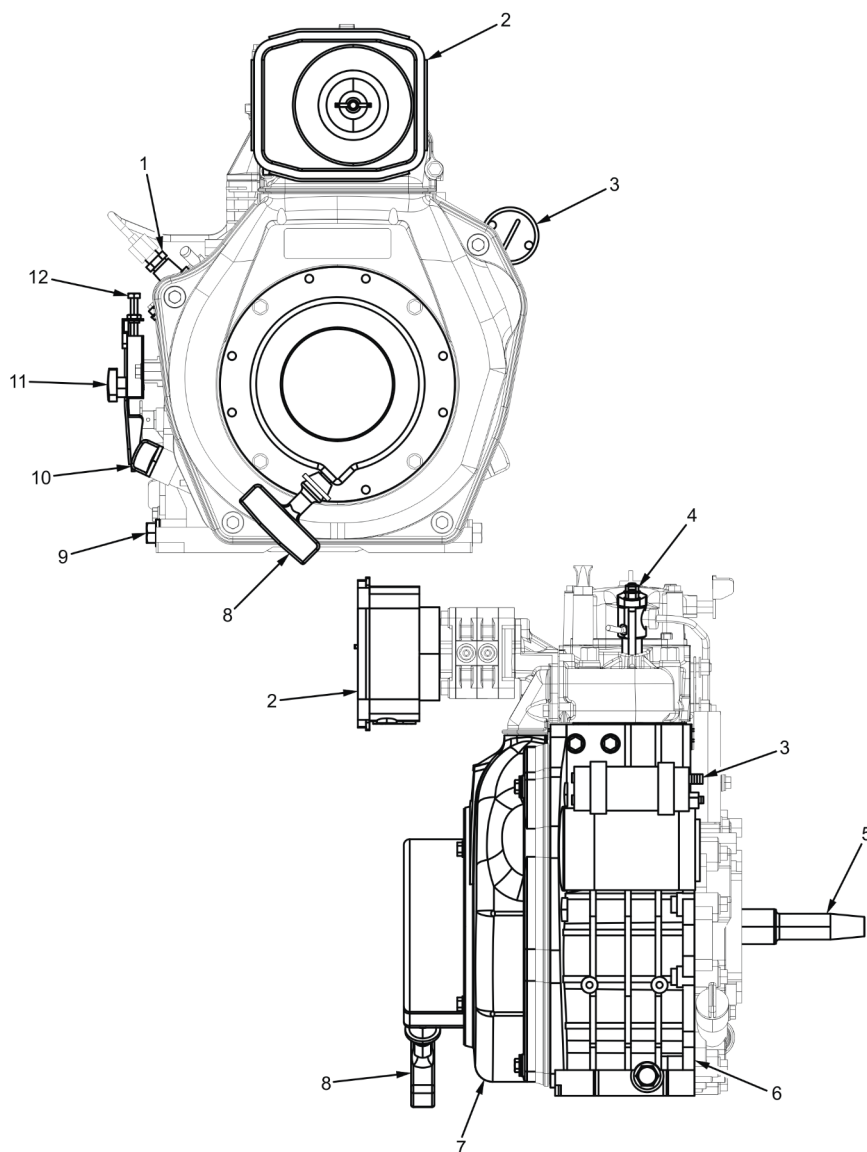


Figure 2. Location Of Engine Assembly Components Model L70AE-DEGFR.

Table 2. Location Of Engine Assembly Components Model L70AE-DEGFR.

ITEM NO.	ITEM NAME
1	Fuel Injection Pump
2	Air Filter and Housing
3	24 VDC Starter Motor
4	Fuel Injector
5	Crankshaft

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS MODEL L70AE-DEGFR – CONTINUED**Table 2. Location Of Engine Assembly Components Model L70AE-DEGFR. – Continued**

ITEM NO.	ITEM NAME
6	Engine Block
7	Flywheel Housing
8	Recoil Start System
9	Engine Oil Filter
10	Oil Fill Cap and Gauge
11	Mechanical Governor
12	Governor Lever

DIFFERENCES BETWEEN MODELS

Model L70AE-DEGFR valve cover mounts with two screws and the air intake housing is different and mounts with two studs. Model L70N6EZ0T9EAFD valve cover mounts with three screws and the air intake housing is different and mounts with one stud and one bolt. Each air intake housing is identical other than orientation. The differences of each component are mentioned in notes and in steps as applicable. Model L70AE-DEGFR mounts the cylinder head with four studs and four nuts and model L70N6EZ0T9EAFD uses four bolts.

EQUIPMENT DATA

Refer to Table 3, Equipment Data, for a summary of specific capabilities, limitations, and critical data for maintenance of the engine assembly.

Table 3. Equipment Data.**WEIGHTS AND DIMENSIONS**

Weight	86.0 pounds (39.0 kilograms)
Length	15.08 inches (38.3 centimeters)
Width	16.58 inches (42.1 centimeters)
Height	17.72 inches (45.0 centimeters)

GENERAL SPECIFICATIONS

Horsepower	6.7 HP (at 3600 RPM)
Operating RPM	3000 to 3600 RPM
Engine cooling system	Forced air cooling
Compression ratio	19.5
Bore x stroke	3.07 x 2.44 inches (78 x 62 millimeters)
Cylinder	One
Displacement	18.1 in ³ (296 cm ³)
Oil requirements:	
MIL-L-46167, OEA	-25°F to +40°F (-31°C to +5°C)
MIL-L-2104, OE/HDO-15/40	+5°F to +120°F (-15°C to +49°C)
MIL-L-2104, OE/HDO-10	-15°F to +40°F (-26°C to +5°C)

EQUIPMENT DATA – CONTINUED**Table 3. Equipment Data. – Continued**

MIL-L-2104, OE/HDO-30	+15°F to +90°F (-9°C to +32°C)
MIL-L-2104, OE/HDO-40	+30°F to +120°F (-1°C to +49°C)
Oil capacity:	
Engine model L70AE-DEGFR	1.2 quarts (1.1 liters)
Engine model L70N6EZ0T9EAFD	1.1 quarts (1.05 liters)
Oil consumption rate (at rated load)	0.04 ounces (1.18 milliliters) per hour

END OF WORK PACKAGE

THEORY OF OPERATION

THEORY OF OPERATION

Principles Of Operation

The theory behind the operation of the engine assembly is described in the following paragraphs. The information contained herein will assist unit, direct support, and general support maintenance personnel in understanding how the engine functions. This knowledge will assist in isolating components which have failed.

ENGINE STARTING SYSTEM (Figure 1)

- a. Normal engine start-up is controlled by the engine starter motor (Figure 1). A recoil starter (Figure 2, Item 5) allows the operator to manually crank the engine should the starter motor fail.
- b. The starter motor consists of three major components: a solenoid (Figure 1, Item 1), continuous current motor, and pinion (Figure 1, Item 10). An armature (Figure 1, Item 11), brushes (Figure 1, Item 17), and field coil (Figure 1, Item 18) create the magnetic force required to operate the solenoid plunger. Brush holders (Figure 1, Item 16) keep the brushes in their proper position. A gear case (Figure 1, Item 7), yoke (Figure 1, Item 12), rear cover (Figure 1, Item 13), and dust covers (Figure 1, Item 2, 3, and 14) protect the internal components of the starter motor. A gear case bearing (Figure 1, Item 9) and rear cover bearing (Figure 1, Item 15) ensure smooth operation.
- c. During operation, the solenoid (Figure 1, Item 1) moves a spring loaded shift lever (Figure 1, Item 5) to engage and disengage the pinion (Figure 1, Item 10). The pinion transfers driving power from the motor to a ring gear. An over-running clutch (Figure 1, Item 6) is used to prevent damage should the engine run too fast.
- d. When the solenoid (Figure 1, Item 1) is energized, magnetic force pulls the solenoid plunger in. As the plunger is pulled in, the torsion spring (Figure 1, Item 4) on the shift lever (Figure 1, Item 5) moves the lever. The lever pushes the pinion (Figure 1, Item 10) away from the pinion stopper (Figure 1, Item 8) and out to engage the engine flywheel. When the solenoid plunger is all the way in, the main contacts close, providing battery power to the motor.
- e. The starter motor will operate until the solenoid (Figure 1, Item 1) is de-energized. Once de-energized, the solenoid's magnetic force is removed and the solenoid plunger slides out, opening the main contacts and removing power from the motor. The shift lever (Figure 1, Item 5) retracts, disengaging the pinion (Figure 1, Item 10) from the engine flywheel ring gear.

THEORY OF OPERATION – CONTINUED

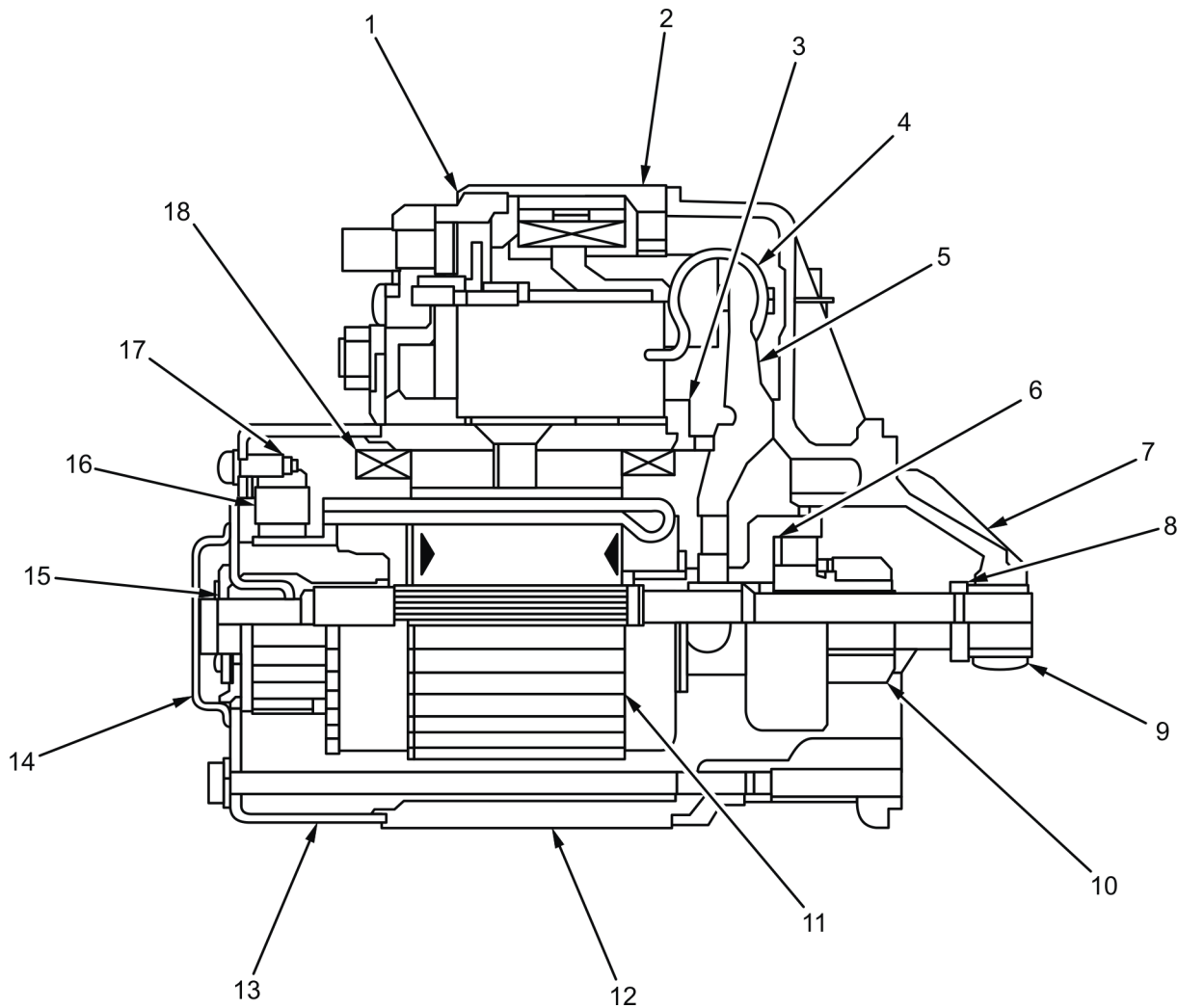


Figure 1. Engine Starter Motor (Side View).

Table 1. Figure 1 Legend.

ITEM NO.	ITEM NAME
1	Solenoid
2	Dust Cover
3	Dust Cover
4	Torsion Spring
5	Shift Lever
6	Over-Running Clutch
7	Gear Case
8	Pinion Stopper
9	Gear Case Bearing

THEORY OF OPERATION – CONTINUED

Table 1. Figure 1 Legend. – Continued

ITEM NO.	ITEM NAME
10	Pinion
11	Armature
12	Yoke
13	Rear Cover
14	Dust Cover
15	Rear Cover Bearing
16	Brush Holder
17	Brush
18	Field Coil

ENGINE COMBUSTION CYCLE. (Figure 2)

- a. **Combustion Cycle:** The diesel engine combustion cycle can be divided into four separate strokes; compression stroke, power stroke, exhaust stroke, and intake stroke. Thus the term “four-stroke engine” is applied to this type of engine.
- b. **Compression Stroke:** During the engine compression stroke the crankshaft (Figure 2, Item 6) turns, forcing the piston (Figure 2, Item 9) to rise to its highest point in the cylinder. The upward movement of the piston compresses air trapped inside the combustion chamber, causing temperature to rise in the chamber. A fine mist of fuel is sprayed into the combustion chamber by the engine’s fuel injector just before the piston reaches its high point. The compressed air and fuel mist mixture combusts in the chamber.
- c. **Power Stroke:** The combustion of the air and fuel mixture forces the piston (Figure 2, Item 9) downward, causing the piston connecting rod to turn the crankshaft (Figure 2, Item 6). The crankshaft is coupled to the end item and drives the end item as designed.
- d. **Exhaust Stroke:** As the crankshaft (Figure 2, Item 6) turns, it pushes up on the connecting rod, forcing the piston (Figure 2, Item 9) to rise to its high point again. Once the piston begins to rise, the exhaust valve (Figure 2, Item 10) opens. Exhaust gases (a result of the air / fuel combustion) are forced out of the cylinder through the exhaust valve. The valve closes just before the piston reaches its high point.
- e. **Intake Stroke:** As the piston (Figure 2, Item 9) moves downward again, the inlet valve (Figure 2, Item 11) opens. Air is drawn through the open valve and into the cylinder. The inlet valve closes just before the piston reaches the end of its stroke (low point in the cylinder). The piston moves upward once more to repeat the combustion cycle.

A decompression lever (Figure 2, Item 1) installed in the rocker arm cover is utilized during manual start operations. A breather (Figure 2, Item 2) regulates the amount of pressure built up on the chamber and opens to release pressure as required. An air cleaner (Figure 2, Item 3) ensures that air entering the combustion chamber is free of particles that could cause damage to engine components.

ENGINE LUBRICATION. (Figure 2)

- a. Engine lubrication is controlled by a crankshaft driven oil pump (Figure 2, Item 8). The oil pump is housed in the engine crankcase and supplies all oil to lubricate and cool high friction internal components. The crankcase acts as the oil sump, since a separate oil pan does not exist. The oil pump draws oil from the oil sump through an oil filter (Figure 2, Item 7). After the oil passes through the filter, it is carried through oil passages to lubricate the crankshaft and camshaft bearings.

THEORY OF OPERATION – CONTINUED

- b. Oil level in the crankcase is measured using a gauge attached to the oil fill cap. Markings on the gauge indicate the amount of oil in the engine. An engine drain plug allows the engine oil to be drained to a pan during servicing.

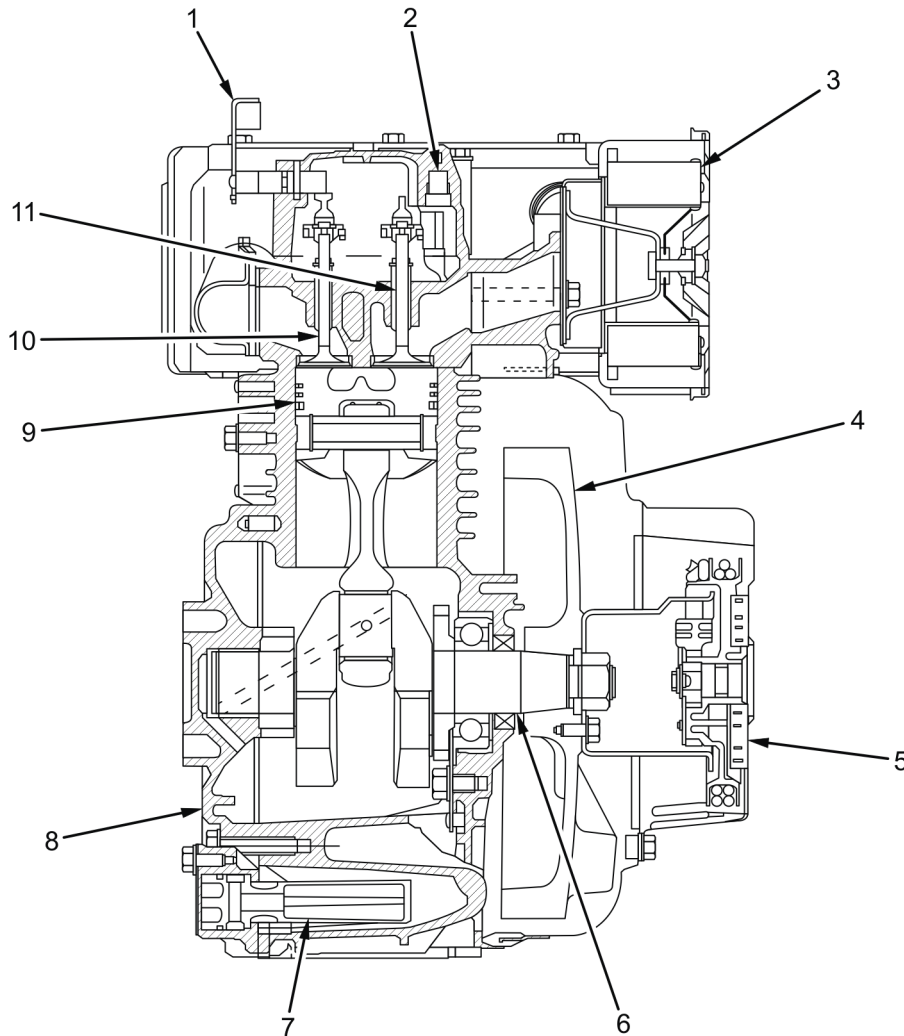


Figure 2. Engine Components (Side View).

Table 2. Figure 2 Legend.

ITEM NO.	ITEM NAME
1	Decompression Lever
2	Breather
3	Air Cleaner
4	Flywheel
5	Recoil Starter
6	Crankshaft

THEORY OF OPERATION – CONTINUED

Table 2. Figure 2 Legend. – Continued

ITEM NO.	ITEM NAME
7	Oil Filter
8	Oil Pump
9	Piston
10	Exhaust Valve
11	Inlet Valve

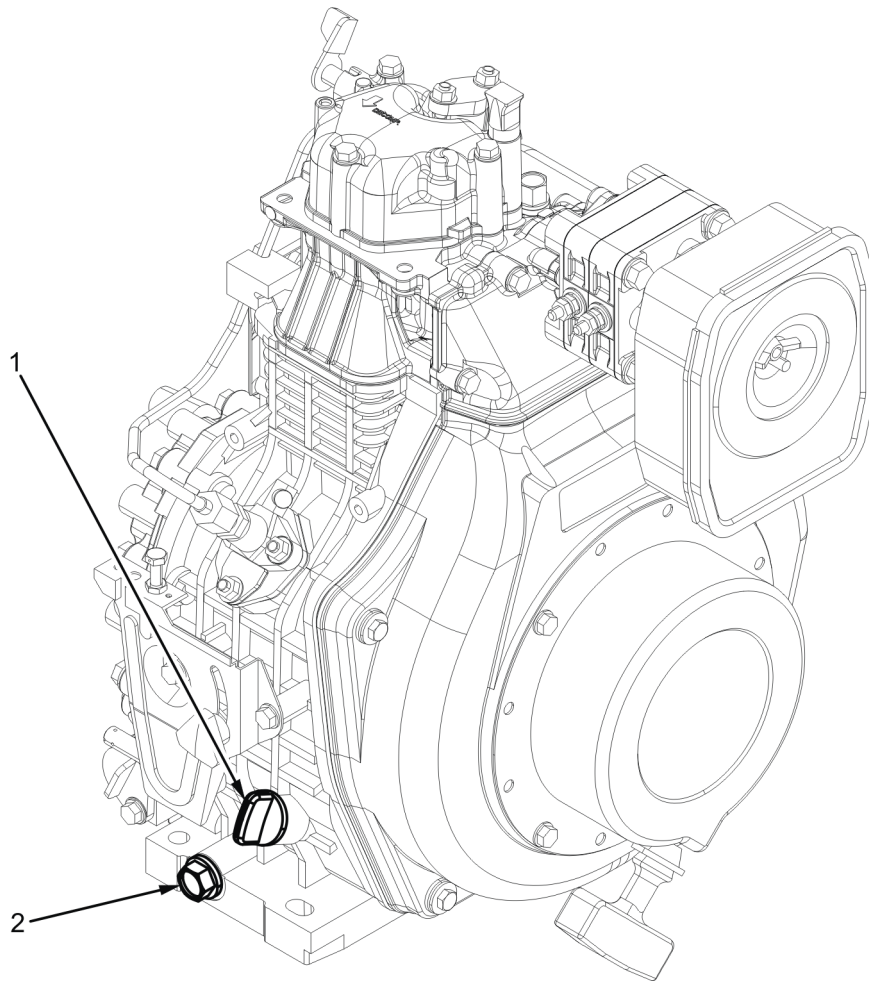


Figure 3. Engine Oil Plug and Cap.

Table 3. Figure 3 Legend.

ITEM NO.	ITEM NAME
1	Fill Cap
2	Drain Plug

THEORY OF OPERATION – CONTINUED**Operating Instructions**

Diesel engine assembly operating instructions are not provided in this manual. Refer to the end item Operator's Manual for detailed operating instructions.

END OF WORK PACKAGE

CHAPTER 2

FIELD TROUBLESHOOTING PROCEDURES

FIELD MAINTENANCE

FIELD TROUBLESHOOTING INDEX

INTRODUCTION

This Work Package (WP) contains troubleshooting information for field level maintenance personnel to locate and correct malfunctions for the engine assembly. These malfunctions may be observed by the maintainer during Preventive Maintenance Checks and Services (PMCS) and during normal operation of equipment, or while performing maintenance.

Troubleshooting consists of isolating the component, using testing devices and tools listed in the Maintenance Allocation Chart (MAC) contained in WP 0022.

The symptom/malfunction index for engine assembly lists faults associated with power distribution unit operation. WP 0005 provides field troubleshooting steps for each malfunction, including steps to help you determine probable causes and corrective actions to take. The symptom index cannot list all faults that may occur, or all the tests, inspections, and corrective actions. If a malfunction is not listed or cannot be corrected by corrective actions listed, notify next higher level of maintenance for assistance.

SYMPTOM TROUBLESHOOTING PROCEDURES INDEX

Malfunction/Symptom	Troubleshooting Procedure
---------------------	---------------------------

ENGINE STARTING TROUBLESHOOTING

- | | |
|--------------------------------|---------|
| 1. Engine Will Not Crank | WP 0005 |
| 2. Engine Will Not Start | WP 0005 |

ENGINE RUNNING TROUBLESHOOTING

- | | |
|--|---------|
| 3. Engine Starts and Stops | WP 0005 |
| 4. Engine Speed Fluctuates (Races or Uneven Speed) | WP 0005 |
| 5. Engine Output Drops | WP 0005 |
| 6. Engine Runs Rough | WP 0005 |
| 7. Low Compression Pressure | WP 0005 |
| 8. Engine Emits White Smoke | WP 0005 |
| 9. Engine Emits Black Smoke | WP 0005 |

END OF WORK PACKAGE

FIELD MAINTENANCE

FIELD TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Personnel Required

Power Equipment Specialist 91D (1)

References

WP 0006
WP 0011

References - cont'd

WP 0018
WP 0014
WP 0015
TM 9-6115-639-13&P

TROUBLESHOOTING PROCEDURES

This Work Package (WP) contains troubleshooting information and tests for the maintainer to locate and correct malfunctions for Diesel Engine Assemblies L70AE-DEGFR and L70N6EZ0T9EAFD. These malfunctions may be observed by the maintainer during Preventive Maintenance Checks and Services (PMCS) and during normal operations of the system. The malfunction/symptom index lists malfunctions which are authorized by the Maintenance Allocation Chart (MAC) followed by a list of probable causes and corrective action.

The symptom index for Diesel Engine Assemblies L70AE-DEGFR and L70N6EZ0T9EAFD lists faults associated with Diesel Engine Assemblies L70AE-DEGFR and L70N6EZ0T9EAFD assembly operation for a malfunction. The malfunction listed includes a reference to the WP that contains a chart to help you determine probable causes and corrective actions to take. The symptom index cannot list all faults that may occur, or all possible tests or inspections and corrective actions. If a malfunction is not listed or cannot be corrected by the corrective actions listed, notify the next higher level of maintenance for assistance.

TROUBLESHOOTING PROCEDURE(S)

ENGINE STARTING TROUBLESHOOTING

SYMPTOM

Engine Will Not Crank

MALFUNCTION

Damaged or defective starter motor.

CORRECTIVE ACTION

Remove and replace starter motor. Refer to TM 9-6115-639-13&P for procedures.

MALFUNCTION

Loosened or corroded battery terminal.

TROUBLESHOOTING – CONTINUED**CORRECTIVE ACTION****WARNING**

Wash hands or wear gloves when handling corroded battery terminals. Corrosion from battery terminal could injure skin. Failure to observe this warning can result in injury to personnel.

Reconnect battery terminal. Repair corroded terminal. Refer to TM 9-6115-639-13&P for procedures.

MALFUNCTION

Discharged battery.

CORRECTIVE ACTION

Charge battery or replace. If discharged, check charging circuit. Refer to TM 9-6115-639-13&P for procedures.

MALFUNCTION

Engine seizure.

CORRECTIVE ACTION

Replace engine. Refer to TM 9-6115-639-13&P for procedures.

SYMPTOM

Engine Will Not Start

MALFUNCTION

Air filter clogged.

CORRECTIVE ACTION

Remove and replace air filter (WP 0015).

MALFUNCTION

Kinked, blocked, or clogged fuel line.

CORRECTIVE ACTION

Adjust fuel line and/or clear line of blockage.

MALFUNCTION

Improper valve/rocker arm clearance.

CORRECTIVE ACTION

Adjust valve clearance (WP 0014).

TROUBLESHOOTING – CONTINUED**MALFUNCTION**

Fuel Injection pump shim out of adjustment.

CORRECTIVE ACTION

Adjust shim thickness/injection timing (WP 0017).

MALFUNCTION

Clogged, sticking, or worn fuel injector nozzle.

CORRECTIVE ACTION

Remove and replace fuel injector (WP 0018).

MALFUNCTION

Damaged or defective fuel injection pump.

CORRECTIVE ACTION

Remove and replace fuel injection pump (WP 0017).

ENGINE RUNNING TROUBLESHOOTING**SYMPTOM**

Engine Starts and Stops

MALFUNCTION

Air filter clogged.

CORRECTIVE ACTION

Remove and replace air filter (WP 0015).

MALFUNCTION

Check for damaged air heater or air heater electrical leads.

CORRECTIVE ACTION

Remove and replace air heaters (WP 0015).

MALFUNCTION

Kinked or clogged fuel line.

CORRECTIVE ACTION

Adjust fuel line and/or clear line of blockage.

TROUBLESHOOTING – CONTINUED**MALFUNCTION**

Clogged, sticking, or worn fuel injector nozzle.

CORRECTIVE ACTION

Remove and replace fuel injector (WP 0018).

SYMPTOM

Engine Speed Fluctuates (Races or Uneven Speed)

MALFUNCTION

Governor control regulator spring out of position.

CORRECTIVE ACTION

Adjust governor lever (WP 0011).

SYMPTOM

Engine Output Drops

MALFUNCTION

Clogged or dirty air cleaner.

CORRECTIVE ACTION

Remove and replace air cleaner element (WP 0015).

MALFUNCTION

Improper valve/rocker arm clearance.

CORRECTIVE ACTION

Adjust valve clearance (WP 0014).

MALFUNCTION

Clogged, sticking, or worn fuel injector nozzle.

CORRECTIVE ACTION

Remove and replace fuel injector (WP 0018).

MALFUNCTION

Damaged or defective fuel injection pump.

CORRECTIVE ACTION

Remove and replace fuel injection pump (WP 0017).

TROUBLESHOOTING – CONTINUED**SYMPTOM**

Engine Runs Rough

MALFUNCTION

Air filter clogged.

CORRECTIVE ACTION

Remove and replace air filter (WP 0015).

MALFUNCTION

Clogged, sticking, or worn fuel injector nozzle.

CORRECTIVE ACTION

Remove and replace fuel injector (WP 0018).

MALFUNCTION

Governor control regulator spring out of position.

CORRECTIVE ACTION

Adjust governor lever (WP 0011).

MALFUNCTION

Fuel Injection pump shim out of adjustment.

CORRECTIVE ACTION

Adjust shim thickness/injection timing (WP 0017).

MALFUNCTION

Damaged or defective fuel injection pump.

CORRECTIVE ACTION

Remove and replace fuel injection pump (WP 0017).

SYMPTOM

Low Compression Pressure

MALFUNCTION

Improper valve/rocker arm clearance.

CORRECTIVE ACTION

Adjust valve clearance (WP 0014).

TROUBLESHOOTING – CONTINUED**MALFUNCTION**

Leaks around fuel injector.

CORRECTIVE ACTION

Tighten injector nuts to 7 to 9 foot-pounds (ft-lb) (100 to 120 kilogram-centimeters (kg-cm)) (WP 0018).

SYMPTOM

Engine Emits White Smoke

MALFUNCTION

Engine oil level is too high. Check for contaminants in the oil system.

CORRECTIVE ACTION

Drain and service engine oil (WP 0006).

MALFUNCTION

Improper valve/rocker arm clearance.

CORRECTIVE ACTION

Adjust valve clearance (WP 0014).

MALFUNCTION

Improper injection timing.

CORRECTIVE ACTION

Adjust fuel injection pump timing by removing shims (WP 0017).

SYMPTOM

Engine Emits Black Smoke

MALFUNCTION

Clogged or dirty air filter.

CORRECTIVE ACTION

Remove and replace air filter (WP 0015).

MALFUNCTION

Clogged, sticking, or worn fuel injector nozzle.

CORRECTIVE ACTION

Remove and replace fuel injector (WP 0018).

TROUBLESHOOTING – CONTINUED**MALFUNCTION**

Damaged governor control component.

CORRECTIVE ACTION

Remove and replace damaged control component (WP 0011).

MALFUNCTION

Improper injection timing.

CORRECTIVE ACTION

Adjust fuel injection pump timing by removing shims (WP 0017).

MALFUNCTION

Damaged or defective fuel injection pump.

CORRECTIVE ACTION

Remove and replace fuel injection pump (WP 0017).

END OF WORK PACKAGE

CHAPTER 3

FIELD MAINTENANCE INSTRUCTIONS

FIELD MAINTENANCE
SERVICE UPON RECEIPT

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP
0022, Table 2, Item 2)

References

WP 0002
WP 0016

Personnel Required

Power Equipment Specialist 91D (2)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

SERVICE UPON RECEIPT OF MATERIEL**Checking Unpacked Equipment**

Perform service upon receipt of the engine in the following manner.

1. Perform Unpacking.
2. Perform Installation.
3. Perform Preliminary Servicing of Equipment.

SERVICE UPON RECEIPT OF MATERIEL – CONTINUED

4. Perform Preliminary Checks and Adjustment of Equipment.

Unpacking**Drain Engine Oil.****WARNING**

The engine is heavy. Personnel should not lift the engine manually rather provide adequate lifting device to support the weight. Use lifting ring for lifting purpose and use caution when lifting or moving the engine assembly. Failure to observe this warning can result in injury to personnel and/or damage to equipment.

1. Using a lifting device capable of lifting 100 pounds or more, remove the engine assembly from its shipping container. Place on a suitable work surface.
2. Remove packing material from engine assembly.
3. Inspect the engine assembly for damage incurred during shipping. If the equipment has been damaged, report the damage on the appropriate form as required.
4. Check the engine assembly against the packing slip to ensure that the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 750-8.
5. Check all tags and forms accompanying the engine assembly for special instructions. Do not remove any forms or tags until the unit is installed and ready for operation. When the unit is installed, remove forms and tags and forward to Quality Control (QC) section office.
6. Place oil catch pan under end oil drain plug (Figure 1, Item 2).
7. Remove engine oil fill cap (Figure 1, Item 1) to vent engine crankcase while draining.
8. Remove oil drain plug (Figure 1, Item 2) and drain preservative oil from crankcase.
9. Once preservative oil is drained, install drain plug (Figure 1, Item 2) and remove oil catch pan. Dispose of oil in accordance with local ordinance.
10. Fill engine crankcase with oil in accordance with Fill Engine Oil.

END OF TASK**INSTALL****Fill Engine Oil**

1. Remove engine oil fill cap (Figure 1, Item 1).

CAUTION

Do not overfill crankcase. Damage to engine will result.

Do not fill from top. Fill from bottom to avoid overfill and damage to engine.

2. Inspect and clean oil filter in accordance with WP 0016.
3. Fill engine with required oil until oil level reaches threaded opening of oil fill cap (Figure 1, Item 1). Refer to WP 0002, Table 3, Equipment Data, for recommended oils and capacities.
4. Install oil fill cap (Figure 1, Item 1).

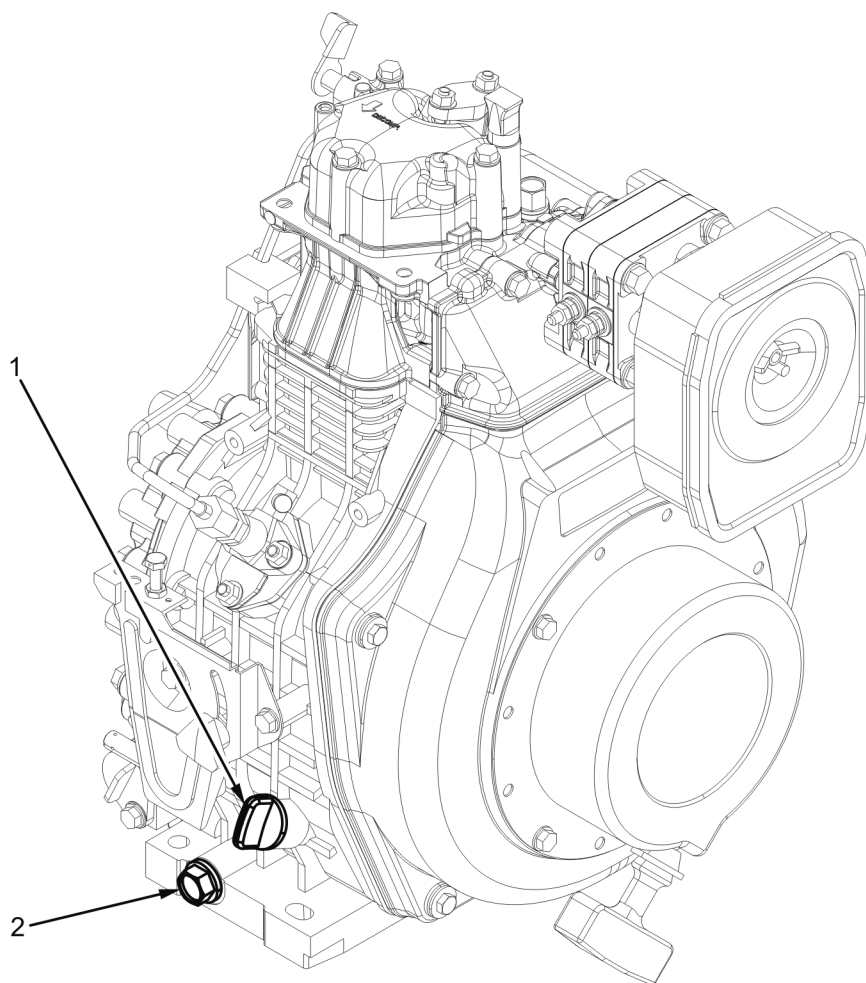
INSTALL – CONTINUED

Figure 1. Engine Oil Servicing.

END OF TASK**PRELIMINARY SERVICING OF EQUIPMENT**

For lubrication instructions, refer to Drain Engine Oil and Fill Engine Oil tasks. Use correct grade of lubricant for seasonal temperature expected.

END OF TASK

PRELIMINARY CHECKS AND ADJUSTMENT OF EQUIPMENT

1. (US Army and Air Force) Inspect equipment for possible damage incurred during shipment. If equipment has been damaged, report damage on SF Form 368, Product Quality Deficiency Report.
2. (US Army) Check equipment against packing slip to see if shipment is complete. Report all differences using procedure given in DA PAM 750-8

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

FIELD PMCS INTRODUCTION

INTRODUCTION TO FIELD PMCS TABLE

Field Preventive Maintenance Checks and Services (PMCS) means systematic caring for, inspection of, and servicing of equipment to keep it in good condition. It prevents breakdowns and ensures the engine assembly is ready for operation at all times. The engine assembly must be inspected so that defects can be discovered and corrected before they result in damage or failure. This section lists PMCS authorized for field maintenance level.

1. Be sure to perform your PMCS in the same order, so it gets to be a habit. Once you have had some practice, you will quickly spot anything wrong.
2. Pay attention to WARNINGS, CAUTIONS, and NOTES.
3. Perform all PMCS tasks at the intervals noted in WP 0008, Table 1. Do not skip PMCS intervals.
4. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults you discover, unless you can fix them. You DO NOT need to record faults that you fix.

Explanation of Table Entries

Your PMCS, WP 0008, lists inspections and care required to keep your engine assembly in good operating condition.

Item No. Column. The Item No. column lists each check or service in chronological order.

Interval Column. The Interval column tells you when to do a certain check or service. Intervals are based on operating hours, unless otherwise noted.

Item to be Checked or Serviced Column. The Item to be Checked or Serviced column directs maintenance personnel to the general area on the engine assembly where the check or service is to be performed.

Procedure Column. The Procedure column tells you how to do required checks and services. Tolerances, adjustment limits, and instrument readings are included as applicable. When replacement or repair of a component is required, the procedures column will direct you to the appropriate task.

Equipment Not Ready/Available if: Column. This column tells you when your engine assembly is not mission capable and why it cannot be used.

If the engine assembly does not perform as required, see WP 0005, Field Troubleshooting Procedures.

If anything looks wrong and you cannot fix it, write it on your DA Form 2404. IMMEDIATELY report it to your supervisor.

When you perform PMCS you will always need a cleaning cloth or rag (WP 0023, Table 1, Item 1). One cleaning cloth or rag is required, but more are recommended. Following are checks that are common to the entire engine assembly:

1. Keep It Clean. Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (WP 0023, Table 1, Item 8) on all metal surfaces. Use soap and water when you clean rubber or plastic material.
2. Rust and Corrosion. Check engine assembly components for rust and corrosion. If any bare metal or corrosion exists, clean and apply a thin coat of oil (WP 0023, Table 1, Item 5). Report it to your supervisor.
3. Bolts, Nuts, and Screws. Check them for obvious looseness, missing, bent, stripped threads, rounded heads, or broken condition. You cannot check them all with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find a bolt, nut, or screw that is loose, tighten it.
4. Welds. Look for loose or chipped paint, rust, cracks, or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.

INTRODUCTION TO FIELD PMCS TABLE – CONTINUED

5. Electric Wires and Connectors. Look for cracked, frayed, or broken insulation, bare wires, and loose, dirty, or broken connectors. Tighten loose connectors. Clean dirty connectors. Report any damaged wires to your supervisor.
6. Hoses and Fluid Lines. Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, replace it.

CLEANING AGENTS**WARNING**

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

CAUTION

When cleaning, engine must be COLD (same temperature as outside air). DO NOT point water stream directly at any electrical connection. DO NOT use high pressure water supply system. Damage to engine, electrical system, and other components may result.

CAUTION

Do not use compressed air to dry. Do not run engine to decrease drying time. Damage to components may result.

CAUTION

When using water to clean the engine assembly, always cover all air ducts and exhaust ports using waterproof material to prevent damage to components. Cover all electrical components and connections. Damage to components may result.

NOTE

Only use those authorized cleaning solvents or agents listed in Appendix E, Expendable and Durable Items List.

- a. Use water pressure and volume similar to a standard household water supply (50 pounds per square inch (psi) maximum, 3 gallons per minute).
- b. After cleaning, allow engine assembly to air dry.
- c. Remove all component covers after cleaning.
- d. When cleaning grease build-up or rusty places, use cleaning solvent (WP 0023, Table 1, Item 8), then apply a thin coat of light oil (WP 0023, Table 1, Item 3) to affected area after wiping clean.

END OF WORK PACKAGE

FIELD MAINTENANCE

FIELD PREVENTIVE MAINTENANCE CHECKS AND SERVICES
(PMCS), INCLUDING LUBRICATION INSTRUCTIONS

INITIAL SETUP:

Tools and Special Tools

Tool Kit, General Mechanic's Automotive (WP
0022, Table 2, Item 2)

References

WP 0006
WP 0014
WP 0015
WP 0016
WP 0017
WP 0018

Personnel Required

Power Equipment Specialist 91D (1)

Table 1. Field PMCS for Engine Assembly.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
WARNING REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock. WARNING Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel. WARNING Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel. WARNING Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.				

Table 1. Field PMCS for Engine Assembly. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
CAUTION Never fill or add oil at the top-fill location. The engine could be severely damaged if over-filled. Always check the oil level at the bottom fill location to ensure proper oil level.				
1	25 Hours for L70AE-DEGFR	Engine oil and filter	Perform first oil and filter change (WP 0016).	Engine oil or filter has not been changed.
2	50 Hours for L70N6EZ0T9EAFD	Engine oil and filter	Perform first oil and filter change (WP 0016).	Engine oil or filter has not been changed.
3	100 Hours/ Semianually for L70AE-DEGFR	Engine lubricating oil system	NOTE Engine lubrication procedure is dependent on engine model. Reference item no. 5 for sets with L70N6EZ0T9EAFD engines. Service engine lubricating oil.	Engine oil has not been changed or filter has not been cleaned.
4	100 hours	Oil filter	Remove and clean engine oil filter (WP 0016). Replace as required.	Oil filter is clogged, dirty, or damaged.
5	200 Hours/ Semianually for L70N6EZ0T9EAFD	Engine lubricating oil system	NOTE Engine lubrication procedure is dependent on engine model. Reference item no. 3 for sets with L70AE-DEGFR engines. Service engine lubricating oil.	Engine oil has not been changed or filter has not been cleaned.
6	500 hours	Air filter	Remove and replace air filter (WP 0015).	Air filter is clogged or damaged.
7	500 hours	Fuel injection pump	a. Inspect fuel injection pump for damage and evidence of leakage. b. Check area around pump sealing gasket for leaks. Remove and replace gasket as required (WP 0017).	Fuel leak of any kind is present.

Table 1. Field PMCS for Engine Assembly. – Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
8	500 hours	Valve clearance	Adjust valve clearance (WP 0014).	Valves are not properly adjusted, causing improper engine operation.
9	1000 hours	Fuel injector nozzle	Remove and replace fuel injector nozzle (WP 0018).	Fuel injector nozzle has not been replaced.

MANDATORY REPLACEMENT PARTS

There are no replacement parts required for these PMCS procedures.

LUBRICATION INSTRUCTIONS

In dusty and dry environments, change oil and air filter ahead of schedule to reduce generator set problems.

- These lubrication instructions are for field level maintenance personnel. Lube intervals (on-condition or hard time) are based on normal operation. Lube more during constant use and less during inactive periods. Use correct grade of lubricant for seasonal temperature expected. See Table 2.
- Always wipe clean all oil filler components before starting your lube service. Use correct type or grade of oil. Overfilling will cause spillage and harm engine components.
- Change engine oil filter, as applicable, when:
 - It is known to be contaminated or clogged.
 - The prescribed hard-time services interval has arrived.
- This equipment is not enrolled in the Army Oil Analysis Program (AOAP). Hard-time service intervals apply.
- For equipment under manufacturer's warranty, hard-time oil service intervals must be followed. Intervals must be shortened if lubricants are known to be contaminated or if operation is under adverse conditions such as longer-than-usual operating hours, extended idling periods, or extreme dust. **CHANGE OIL AT 50-HOUR INTERVALS IN EXTREMELY DUSTY ENVIRONMENTS.**

Table 2. Lubricant Table for Generator Set MEP-831A/MEP-832A.

LUBRICATION MIL SYM-BOL SPECIFICATION	TEMPERATURE RANGE	SYSTEM CAPACITY	INTER-VAL (HOURS)	MAN-HOURS
MIL-L-46167, OEA	-25 to +40 °F (-31 to +5 °C)	**1.2 qt (1.1 liters) / 1.1 qt (1.05 liters)	*100/200	0.25
MIL-L-2104, OE/HDO-15/40	+5 to +120 °F (-15 to +49 °C)	**1.2 qt (1.1 liters) / 1.1 qt (1.05 liters)	*100/200	0.25
MIL-L-2104, OE/HDO-10	-15 to +40 °F (-26 to +5 °C)	**1.2 qt (1.1 liters) / 1.1 qt (1.05 liters)	*100/200	0.25
MIL-L-2104, OE/HDO-30	+15 to +90 °F (-9 to +32 °C)	**1.2 qt (1.1 liters) / 1.1 qt (1.05 liters)	*100/200	0.25
MIL-L-2104, OE/HDO-40	+30 to +120 °F (-1 to +49 °C)	**1.2 qt (1.1 liters) / 1.1 qt (1.05 liters)	*100/200	0.25
* Lube intervals for L70AE-DEGFR are 100 Hours / Semiannually. Lube intervals for L70N6EZ0T9EAFD are 200 Hours / Semiannually. Applicable interval and capacity can be identified by referencing the oil capacity plate on the inside of the main access cover.				
** System capacity for L70AE-DEGFR is 1.2 qt (1.1 liters) and for L70N6EZ0T9EAFD is 1.1 qt (1.05 liters).				

6. Drain and service engine oil and filter as follows:

- a. Unlock main access cover latches and lift cover to open.
- b. Place oil catch pan under oil drain plug (Figure 1, Item 1).
- c. Remove engine oil fill cap (Figure 1, Item 2) to vent engine crankcase while draining.
- d. Remove oil drain plug (Figure 1, Item 1). Move oil drain valve (Figure 1, Item 7) to OPEN position and drain oil from crankcase.
- e. Once oil is drained, replace drain plug (Figure 1, Item 1) and move valve (Figure 1, Item 7) to CLOSE position. Remove oil catch pan. Dispose of oil in accordance with local ordinance.
- f. Remove oil filter (Figure 1, Item 3) from crankcase cover (Figure 1, Item 4) by removing bolt (Figure 1, Item 5). Remove and discard O-ring (Figure 1, Item 6).
- g. Inspect oil filter (Figure 1, Item 3) for obvious damage. Check filter's mesh material for damage. Clean out clogging dirt and residue. Replace, as required, and dispose of in accordance with local ordinance.
- h. Using a clean rag, inspect area around oil filter port for evidence of leakage. Clean area of dirt and accumulated grime.
- i. Apply a light coat of lubricating oil to new O-ring (Figure 1, Item 6) and place on oil filter.
- j. Slide oil filter (Figure 1, Item 3) into crankcase cover (Figure 1, Item 4) and secure using bolt (Figure 1, Item 5). Do not over tighten bolt. Damage to filter will occur.

- k. Fill engine with required oil until level reaches threaded opening of oil fill cap (Figure 1, Item 2) (up to 1.2 quarts (1.1 liters)). See Table 2 for recommended oils. There should be at least two threads visible in the oil fill opening of the engine block when the engine is full of oil.
- l. Replace oil fill cap (Figure 1, Item 2) and tighten.
- m. Close main access cover and secure, using latches.

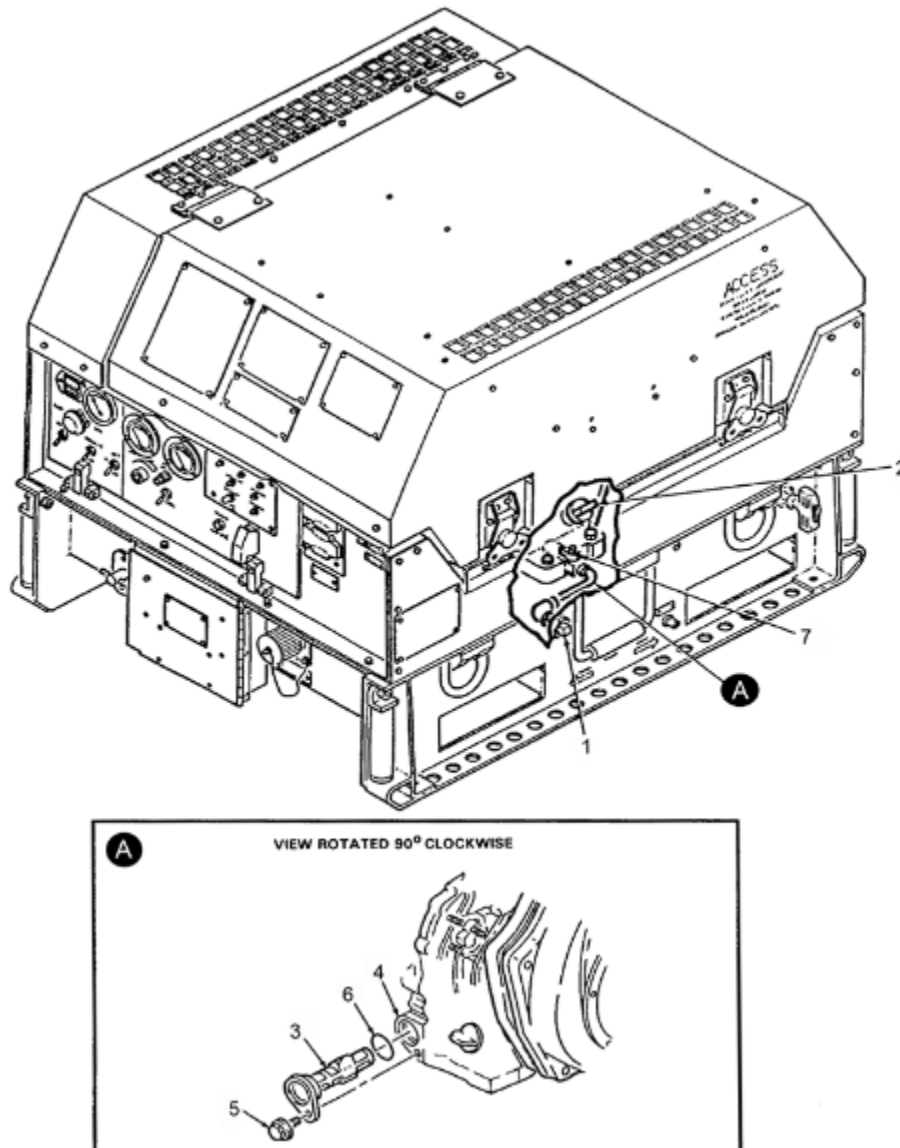


Figure 1. Engine Oil Servicing.

END OF WORK PACKAGE

FIELD MAINTENANCE
ENGINE, DIESEL: INSPECT, SERVICE

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)

References

WP 0008
TM 9-6115-639-13&P

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)

Equipment Condition

Engine installed in gen set

Personnel Required

Power Equipment Specialist 91D (1)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

INSPECT

Inspect engine block for cracks, dents, or corrosion. Replace component if damaged to the extent that it will effect proper operation of the engine. See TM 9-6115-639-13&P for removal and replacement of engine.

END OF TASK

SERVICE

Service according to Lubrication Instructions in WP 0008.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
RECOIL STARTER ASSEMBLY: REMOVE, INSPECT, SERVICE, INSTALL, REPAIR

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)

Personnel Required

Power Equipment Specialist 91D (1)

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)

Equipment Condition

Disconnect battery (TM 9-6115-639-13&P)
Remove air inlet panel on rear side of generator set (TM 9-6115-639-13&P)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

WARNING

Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

REMOVE

1. Remove recoil starter assembly (Figure 1, Item 3) from flywheel housing (Figure 1, Item 5) by removing four bolts (Figure 1, Item 2).

REMOVE – CONTINUED**NOTE**

The following step only needs to be performed if replacing the plunger.

2. Remove plunger (Figure 1, Item 1) from cylinder block by removing three screws (Figure 1, Item 4).

END OF TASK**INSPECT**

1. Inspect recoil starter assembly (Figure 1, Item 3) and plunger (Figure 1, Item 1) for cracks, deformation, or obvious damage. Replace case if damaged.
2. Inspect starter rope for cuts, tears, or frayed strands. Ensure tee handle is securely attached. Ensure rope positioned at 7 o'clock position which is straightest line to rope pull. Replace starter assembly if any component is damaged.

END OF TASK**SERVICE****WARNING**

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

Clean components with cleaning solvent and a clean rag. Allow to air dry.

END OF TASK

INSTALL

1. Install plunger (Figure 1, Item 1) into cylinder block using three screws (Figure 1, Item 4).
2. Mate recoil starter assembly (Figure 1, Item 3) to flywheel housing (Figure 1, Item 5) and secure using four bolts (Figure 1, Item 2).

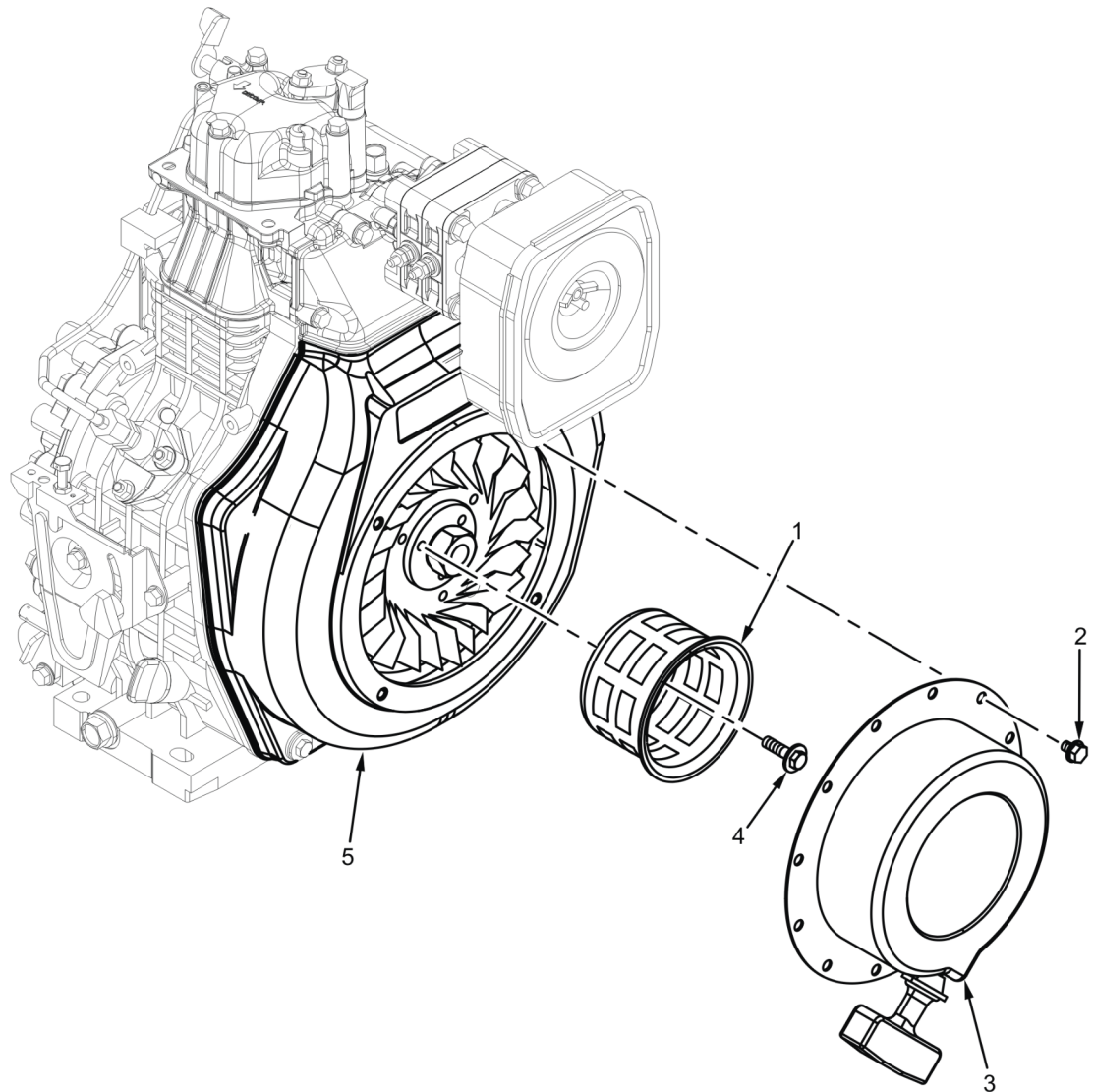


Figure 1. Recoil Starter Assembly.

END OF TASK

REPAIR

Repair is limited to replacing broken component during removal and installation.

END OF TASK**FOLLOW ON MAINTENANCE**

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**GOVERNOR MODULE: REMOVE, INSPECT, SERVICE, INSTALL, REPAIR**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)

Personnel Required

Power Equipment Specialist 91D (1)

Equipment Condition

Disconnect battery (TM 9-6115-639-13&P)

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

REMOVE**WARNING**

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

WARNING

Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

REMOVE – CONTINUED**CAUTION**

Governor lever (Figure 1, Item 5) and torque spring are factory preset. Do not adjust locking nut or cut lockwire.

1. Place governor lever (Figure 1, Item 5) in stop position to unload spring (Figure 1, Item 3 and 8) tension.
2. Release regulator bracket assembly (Figure 1, Item 12) from cylinder block by removing screw (Figure 1, Item 9).
3. Remove screw (Figure 1, Item 11).
4. Disconnect springs (Figure 1, Item 3 and 8) from governor lever (Figure 1, Item 5) and manual control handle (Figure 1, Item 7).

END OF TASK**INSPECT**

Inspect governor control components for damage. Replace any part that is damaged in any way.

END OF TASK**SERVICE****WARNING**

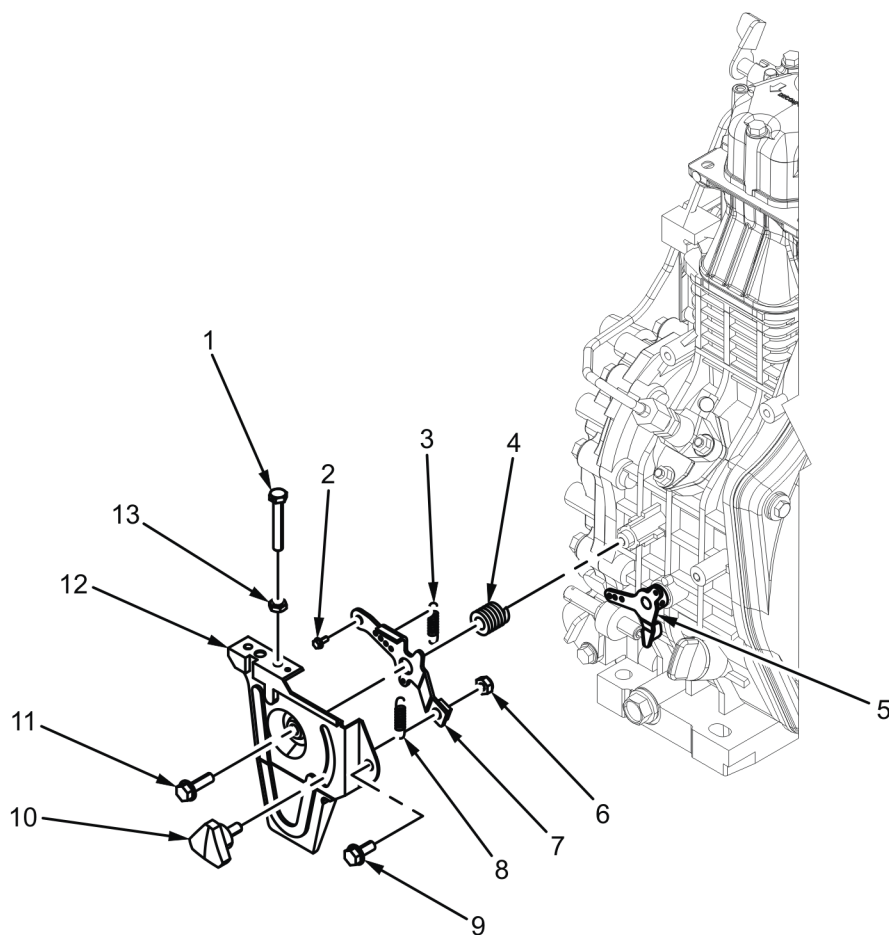
Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

Clean components with cleaning solvent and a clean rag. Allow to air dry.

END OF TASK**INSTALL****WARNING**

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

1. Clean governor control components with cleaning solvent and a clean rag. Allow to air dry.
2. Install screw (Figure 1, Item 2) onto manual control handle (Figure 1, Item 7). Mate handle to regulator bracket assembly (Figure 1, Item 12) and install screw (Figure 1, Item 11).
3. Mate regulator bracket assembly (Figure 1, Item 12) to cylinder block and install screw (Figure 1, Item 9). Connect springs (Figure 1, Item 3 and 8) to handle (Figure 1, Item 7) and lever (Figure 1, Item 5).

INSTALL – CONTINUED**Figure 1. Governor Module.****END OF TASK****REPAIR**

Repair is limited to replacing broken component of the generator between removal and installation.

END OF TASK**FOLLOW ON MAINTENANCE**

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
CYLINDER BLOCK: INSPECT, REPAIR

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)

Personnel Required

Power Equipment Specialist 91D (1)

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)
General purpose grease (WP 0023, Table 1, Item 2)
Engine oil (WP 0023, Table 1, Item 4)

References

WP 0006

Equipment Condition

Disconnect battery (TM 9-6115-639-13&P)
Remove air inlet panel on rear side of generator set (TM 9-6115-639-13&P)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

WARNING

Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

INSPECT

1. Inspect cylinder block (Figure 1, Item 1) for cracks, deformation, or obvious damage. Send items to sustainment for cylinder block replacement.
2. Inspect for leaks around gaskets and seals. Send items to sustainment for crankcase or crankshaft repair.
3. Inspect for loose or damaged hardware. Tighten or replace hardware, as needed.

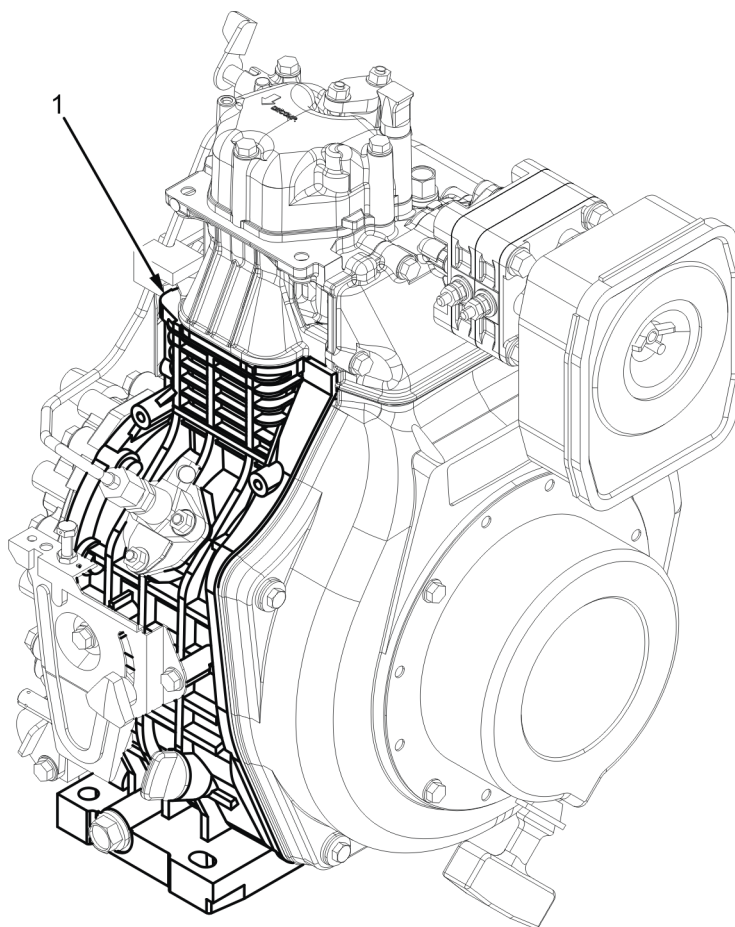


Figure 1. Cylinder Block.

END OF TASK**REPAIR**

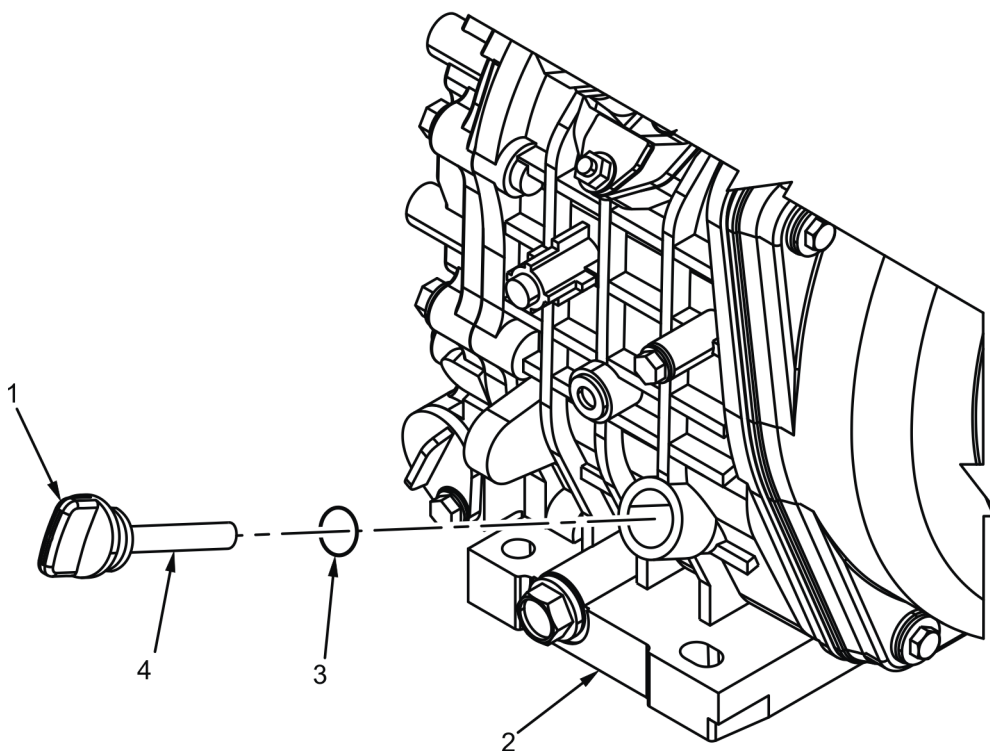
Repair is limited to replacing the oil fill cap.

Replace Oil Cap

1. Remove engine oil fill cap (Figure 2, Item 1) from engine block (Figure 2)). Remove O-ring (Figure 2, Item 3).

REPAIR – CONTINUED

2. Inspect oil fill cap (Figure 2, Item 1) for obvious damage. Check oil level gauge (Figure 2, Item 4) for security of attachment to cap. Inspect for corrosion.
3. Inspect O-ring (Figure 2, Item 3) for cuts, tears, or permanent set. Replace O-ring if it will not allow a proper seal.
4. Inspect area around oil fill port for evidence of leakage. Clean area of dirt and accumulated grime using a clean rag.
5. Apply a light coat of lubricating oil to O-ring (Figure 2, Item 3) and install into oil fill port.
6. Insert engine oil fill cap (Figure 2, Item 1) into engine block (Figure 2, Item 2).

**Figure 2. Fill Cap.****END OF TASK****FOLLOW ON MAINTENANCE**

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

STARTER MOTOR: REPLACE

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)

Personnel Required

Power Equipment Specialist 91D (1)

References

WP 0006

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
 Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)
 General purpose grease (WP 0023, Table 1, Item 2)

Equipment Condition

Disconnect battery (TM 9-6115-639-13&P)
 Remove muffler (TM 9-6115-639-13&P)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

WARNING

Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

REPLACE**NOTE**

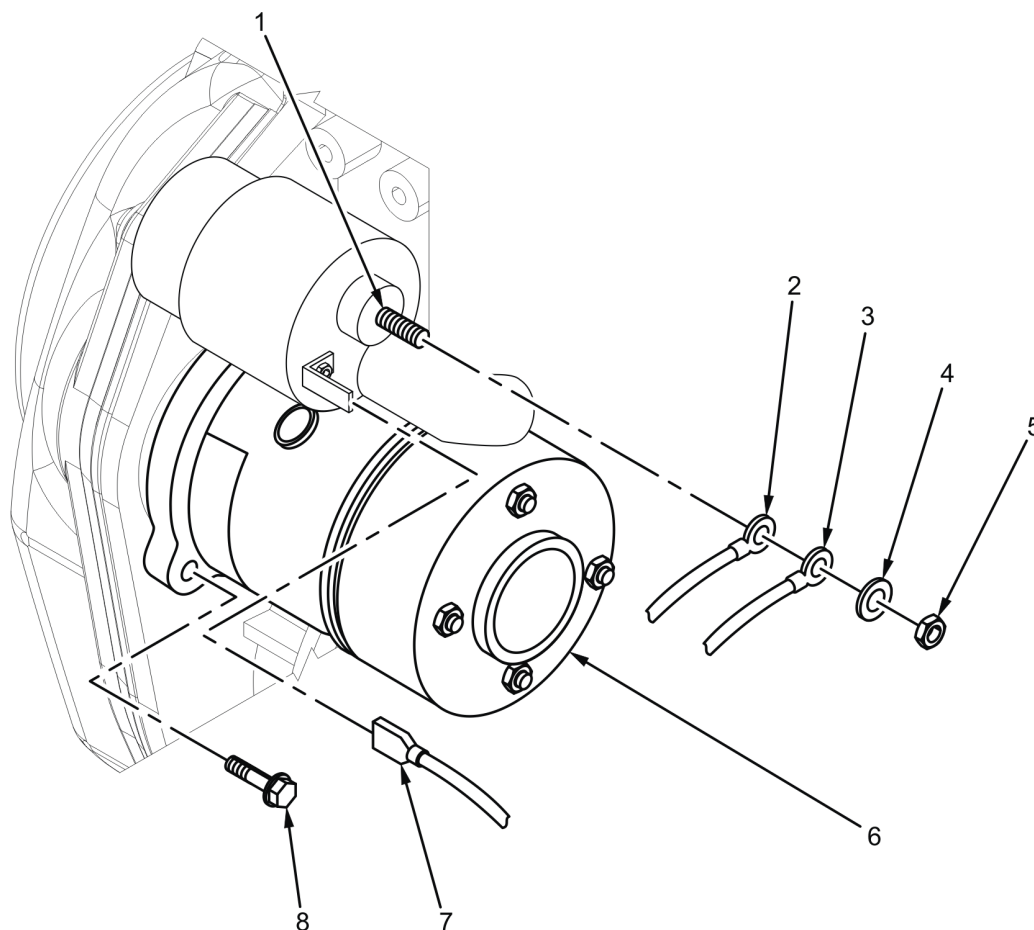
Wiring shown in Figure 1 is for a typical connection configuration. Connections will vary with application.

1. Tag and disconnect electrical wires (Figure 1, Item 2 and 3) from connection stud (Figure 1, Item 1) by removing nut (Figure 1, Item 5) and washer (Figure 1, Item 4). Reinstall nut and washer to prevent loss.
2. Tag and disconnect electrical wire (Figure 1, Item 7) from starter solenoid lug.
3. Remove starter motor (Figure 1, Item 6) from cylinder block by removing two screws (Figure 1, Item 8).

WARNING

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

4. Clean starter motor (Figure 1, Item 6) with cleaning solvent and a clean rag. Allow to air dry.
5. Inspect starter motor (Figure 1, Item 6) body for deformation, dents, cracks, deformation, or obvious damage. Replace starter motor if damaged.
6. Test solenoid for evidence of electrical short using multimeter. Replace starter motor, if shorted.
7. Inspect electrical connection studs for corrosive damage. Replace starter motor if any damage is suspected.
8. Install starter motor (Figure 1, Item 6) into cylinder block. Secure using two screws (Figure 1, Item 8).
9. Connect electrical wire (Figure 1, Item 7) to start solenoid lug.
10. Connect electrical wires (Figure 1, Item 2 and 3) to connection stud (Figure 1, Item 1) using nut (Figure 1, Item 5) and washer (Figure 1, Item 4).

REPLACE – CONTINUED**Figure 1. Starter Motor.****END OF TASK****FOLLOW ON MAINTENANCE**

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

ROCKER ARM ASSEMBLY: ADJUST

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)

Personnel Required

Power Equipment Specialist 91D (1)

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)

Equipment Condition

Disconnect battery (TM 9-6115-639-13&P)
Remove air inlet panel on rear side of generator set (TM 9-6115-639-13&P)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

WARNING

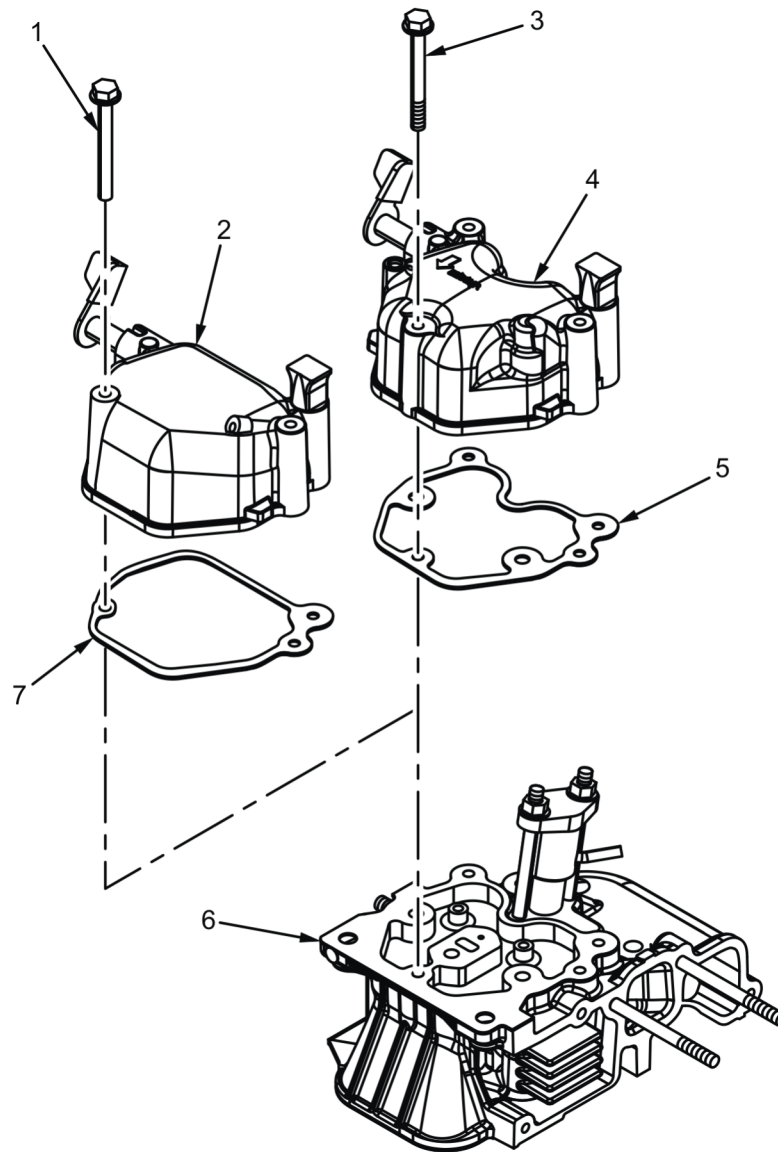
Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

This Work Package (WP) covers rocker arm / valve clearance adjustment.

ADJUST**Valve Clearance**

1. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Remove head cover (Figure 1, Item 2) from cylinder head (Figure 1, Item 6) by removing two bolts (Figure 1, Item 1).
 - b. Remove head cover (Figure 1, Item 4) from cylinder head (Figure 1, Item 6) by removing three bolts (Figure 1, Item 3).
2. Remove cover gasket (Figure 1, Item 5 or 7) only if replacement is required.

ADJUST – CONTINUED

**Figure 1. Head Cover.**

3. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Remove four bolts (Figure 2, Item 8) and flat washers (Figure 2, Item 7), securing flywheel housing assembly (Figure 2, Item 6), and p-clamp (Figure 2, Item 10) from cylinder block (Figure 2, Item 1).
 - b. Remove four bolts (Figure 2, Item 9), securing flywheel housing assembly (Figure 2, Item 6), and p-clamp (Figure 2, Item 10) from cylinder block (Figure 2, Item 1).
4. Remove flywheel housing seal (Figure 2, Item 5) and flywheel housing assembly (Figure 2, Item 6) from cylinder block (Figure 2, Item 1).

ADJUST – CONTINUED

5. Rotate flywheel (Figure 2, Item 2) in the clockwise direction until T mark (Figure 2, Item 4) on flywheel matches V mark (Figure 2, Item 3) on cylinder body fin. Verify that the rocker arms (Figure 3) are not moving as the marks come into alignment. If rocker arms are moving, rotate flywheel another full turn and verify that rocker arms are not moving as marks come into alignment. This is the Top Dead Center (TDC) position. Intake and exhaust valves will be in closed position.

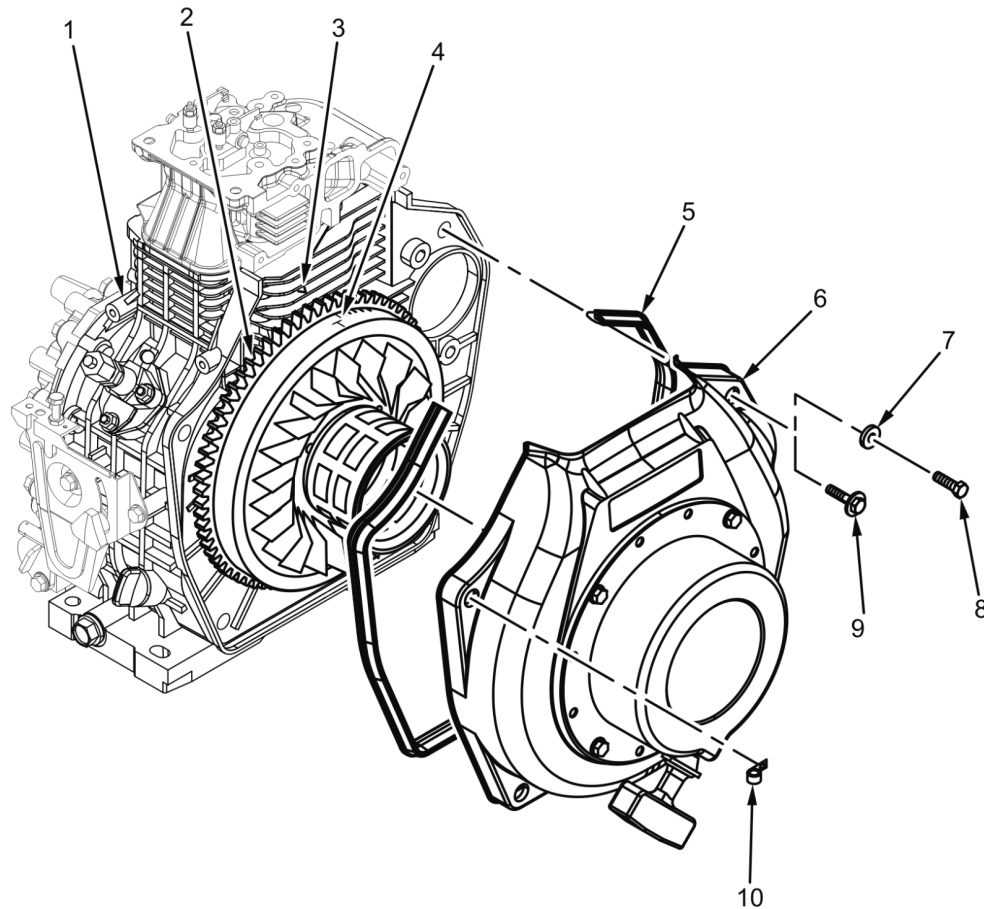


Figure 2. Flywheel Adjustment.

NOTE

As the piston approaches TDC on the firing stroke, the piston is compressing the gas in the cylinder. As a result, the crankshaft will be more difficult to turn.

NOTE

The drag on the feeler gauge when passing through gap shall be minimal. Clearance shall be 0.0039 to 0.0059 inches (0.10 to 0.15 mm).

6. Using a feeler gauge, check rocker arm to valve clearance (Figure 3, Item 1).
7. If adjustment is required, loosen lock nut (Figure 3, Item 3) and rotate adjusting screw (Figure 3, Item 2) clockwise / counterclockwise to reduce / expand gap. Tighten lock nut and recheck clearance.
8. Repeat steps 6 and 7 until proper clearance (Figure 3) is attained.

ADJUST – CONTINUED

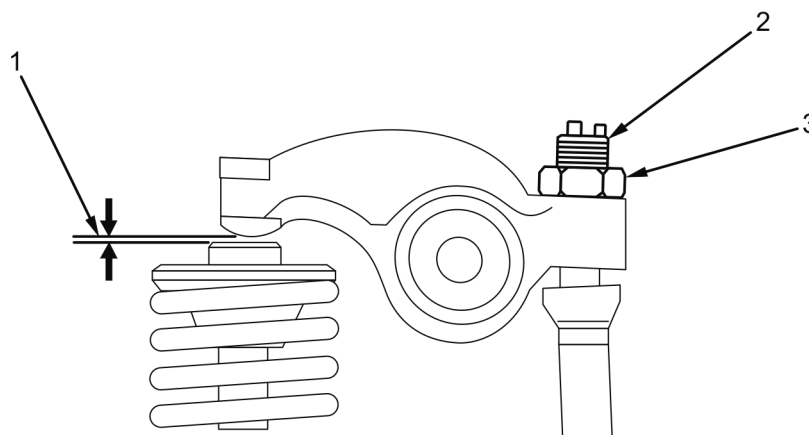


Figure 3. Valve Clearance Adjustment.

9. Install flywheel housing seal (Figure 2, Item 5) and flywheel housing assembly (Figure 2, Item 6) to cylinder block (Figure 2, Item 1).
10. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Install four bolts (Figure 2, Item 8) and flat washers (Figure 2, Item 7) through flywheel housing assembly (Figure 2, Item 6), and p-clamp (Figure 2, Item 11), to cylinder block (Figure 2, Item 1), and secure.
 - b. Install four bolts (Figure 2, Item 9) through flywheel housing assembly (Figure 2, Item 6), and p-clamp (Figure 2, Item 10), to cylinder block (Figure 2, Item 1), and secure.

WARNING

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

11. Clean rocker arm components with cleaning solvent and a clean rag. Allow to air dry.
12. Install new gasket (Figure 1, Item 5 or 7), if removed, onto cylinder head (Figure 1, Item 6).
13. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Install head cover (Figure 1, Item 2) onto cylinder head (Figure 1, Item 6) and install two bolts (Figure 1, Item 1).
 - b. Install head cover (Figure 1, Item 4) onto cylinder head (Figure 1, Item 6) and install three bolts (Figure 1, Item 3).

END OF TASK

FOLLOW ON MAINTENANCE

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**AIR CLEANER ASSEMBLY: REMOVE, INSPECT, SERVICE, INSTALL, REPAIR**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)

Personnel Required

Power Equipment Specialist 91D (1)

Equipment Condition**Materials/Parts**

Cloth, Cleaning (WP 0023, Table 1, Item 1)
Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)

Disconnect battery (TM 9-6115-639-13&P)
Remove air inlet panel on rear side of generator set (TM 9-6115-639-13&P)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

WARNING

Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

REMOVE**NOTE**

The procedures for model L70AE-DEGFR and model L70N6EZ0T9EAFD air cleaner assembly removal and installation are nearly identical. When procedures are identical, Figure 1 is called out by default. If performing maintenance on model L70AE-DEGFR, refer to Figure 1. If performing maintenance on model L70N6EZ0T9EAFD refer to Figure 2 instead.

1. Remove cover (Figure 1, Item 18) from air filter housing (Figure 1, Item 21) by removing wing nut (Figure 1, Item 17) and washer (Figure 1, Item 16).
2. Remove air filter element (Figure 1, Item 19) from housing (Figure 1, Item 21).
3. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Remove housing (Figure 1, Item 21) from adapter (Figure 1, Item 8) by removing three bolts (Figure 1, Item 20).
 - b. Remove housing (Figure 2, Item 21) from adapter (Figure 2, Item 8) by removing three nuts (Figure 2, Item 20).
4. Remove gasket (Figure 1, Item 11).
5. Disconnect electrical wire leads from heaters (Figure 1, Item 7) by removing two nuts (Figure 1, Item 13) and washers (Figure 1, Item 12) . Reinstall nuts and washers to prevent loss.
6. Remove adapter (Figure 1, Item 8), two air heaters (Figure 1, Item 7), and three gaskets (Figure 1, Item 6) from adapter (Figure 1, Item 5) by removing four bolts (Figure 1, Item 10) and washers (Figure 1, Item 9).
7. Remove adapter (Figure 1, Item 5) from air intake duct (Figure 1, Item 22) by removing three nuts (Figure 1, Item 14).
8. Remove gasket (Figure 1, Item 4).
9. Remove studs (Figure 1, Item 2) from air intake duct (Figure 1, Item 22) only if replacement is required.
10. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Remove four bolts (Figure 3, Item 5), flat washers (Figure 3, Item 4) securing flywheel housing assembly (Figure 3, Item 3), and p-clamp (Figure 3, Item 7), from cylinder block (Figure 3, Item 1).
 - b. Remove four bolts (Figure 3, Item 6) securing flywheel housing assembly (Figure 3, Item 3), and p-clamp (Figure 3, Item 7), from cylinder block (Figure 3, Item 1).
11. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Remove air intake duct (Figure 1, Item 22) and gasket (Figure 1, Item 1) by removing one bolt (Figure 1, Item 15) and one bolt (Figure 1, Item 3) from cylinder head.
 - b. Remove air intake duct (Figure 2, Item 22) and gasket (Figure 2, Item 1) by removing two bolts (Figure 2, Item 15) and one bolt (Figure 2, Item 3) from cylinder head.

END OF TASK**INSPECT**

1. Inspect cover (Figure 1, Item 18), housing (Figure 1, Item 21), adapters (Figure 1, Item 5 and 8), and air intake duct (Figure 1, Item 22) for cracks, dents, or corrosion. Replace component if damaged to the extent that it will effect proper operation of the air filtering system.

INSPECT – CONTINUED

2. Inspect two air heaters (Figure 1, Item 7) for obvious damage. Replace if damage is suspected.
3. Inspect gaskets (Figure 1, Item 1, 4, and 6) for cuts, tears, or deformation. Replace if damaged or deformed.

END OF TASK**SERVICE****WARNING**

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

1. Clean electrical connection studs on two air heaters (Figure 1, Item 7) with a stiff wire brush.

CAUTION

Do not clean gaskets and grommets with cleaning solvent. Cleaning solvent can damage gasket and grommet material.

2. Clean remaining components, except for the gaskets and grommets, with cleaning solvent and a clean rag. Allow to air dry.

END OF TASK**INSTALL**

1. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Install air intake duct (Figure 1, Item 22), gasket (Figure 1, Item 1), one bolt (Figure 1, Item 15), and one bolt (Figure 1, Item 3) to cylinder head.
 - b. Install air intake duct (Figure 2, Item 22), gasket (Figure 2, Item 1), two bolts (Figure 2, Item 15), and one bolt (Figure 2, Item 3) to cylinder head.
2. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Install four bolts (Figure 3, Item 5), flat washers (Figure 3, Item 4), and p-clamp (Figure 3, Item 7), through flywheel housing assembly (Figure 3, Item 3) to cylinder block (Figure 3, Item 1), and secure.
 - b. Install four bolts (Figure 3, Item 6), and p-clamp (Figure 3, Item 7), through flywheel housing assembly (Figure 3, Item 3) to cylinder block (Figure 3, Item 1), and secure.
3. Install studs (Figure 1, Item 2) to air intake duct (Figure 1, Item 22), if removed.
4. Install adapter (Figure 1, Item 5) and gasket (Figure 1, Item 4) using three nuts.

NOTE

The air heaters will be installed with the electrical connections on the left and right sides, not the top and bottom.

5. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.

INSTALL – CONTINUED

- a. Install adapter (Figure 1, Item 8), two air heaters (Figure 1, Item 7) and three gaskets (Figure 1, Item 6) using four bolts (Figure 1, Item 10) and washers (Figure 1, Item 9), and secure. Refer to (Figure 1, Item 8) for housing orientation.
 - b. Install adapter (Figure 2, Item 8), two air heaters (Figure 2, Item 7) and three gaskets (Figure 2, Item 6) using four bolts (Figure 2, Item 10) and washers (Figure 2, Item 9), and secure. Refer to (Figure 2, Item 8) for housing orientation.
6. Connect electrical wire leads to heaters using nuts (Figure 1, Item 13) and washers (Figure 1, Item 12), and secure.
7. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Install gasket (Figure 1, Item 11) and filter housing (Figure 1, Item 21) using three bolts (Figure 1, Item 20), and secure.
 - b. Install gasket (Figure 2, Item 11) and filter housing (Figure 2, Item 21) using three nuts (Figure 2, Item 20), and secure.
8. Install filter element (Figure 1, Item 19) into filter housing (Figure 1, Item 21).
9. Install cover (Figure 1, Item 18) onto housing (Figure 1, Item 21) and secure using wing nut (Figure 1, Item 17) and washer (Figure 1, Item 16).

INSTALL – CONTINUED

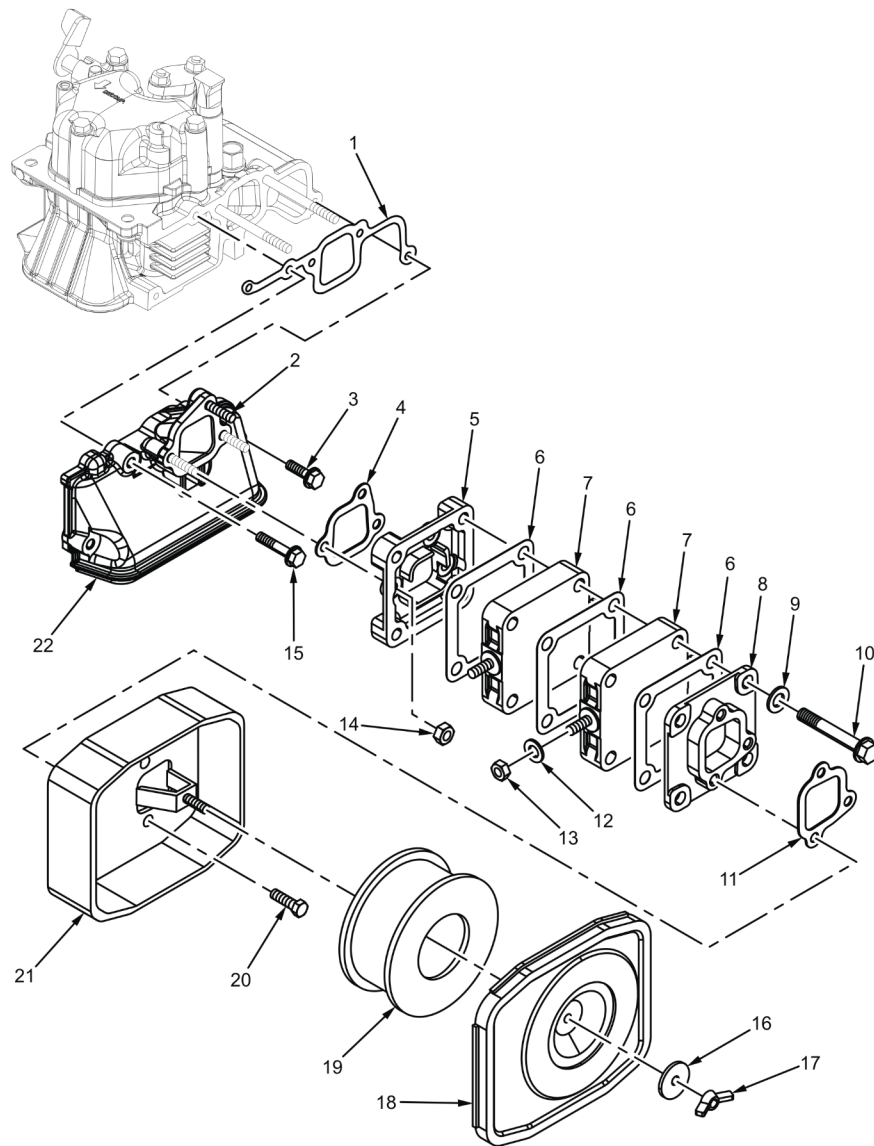


Figure 1. Air Cleaner Assembly L70AE-DEGFR.

INSTALL – CONTINUED

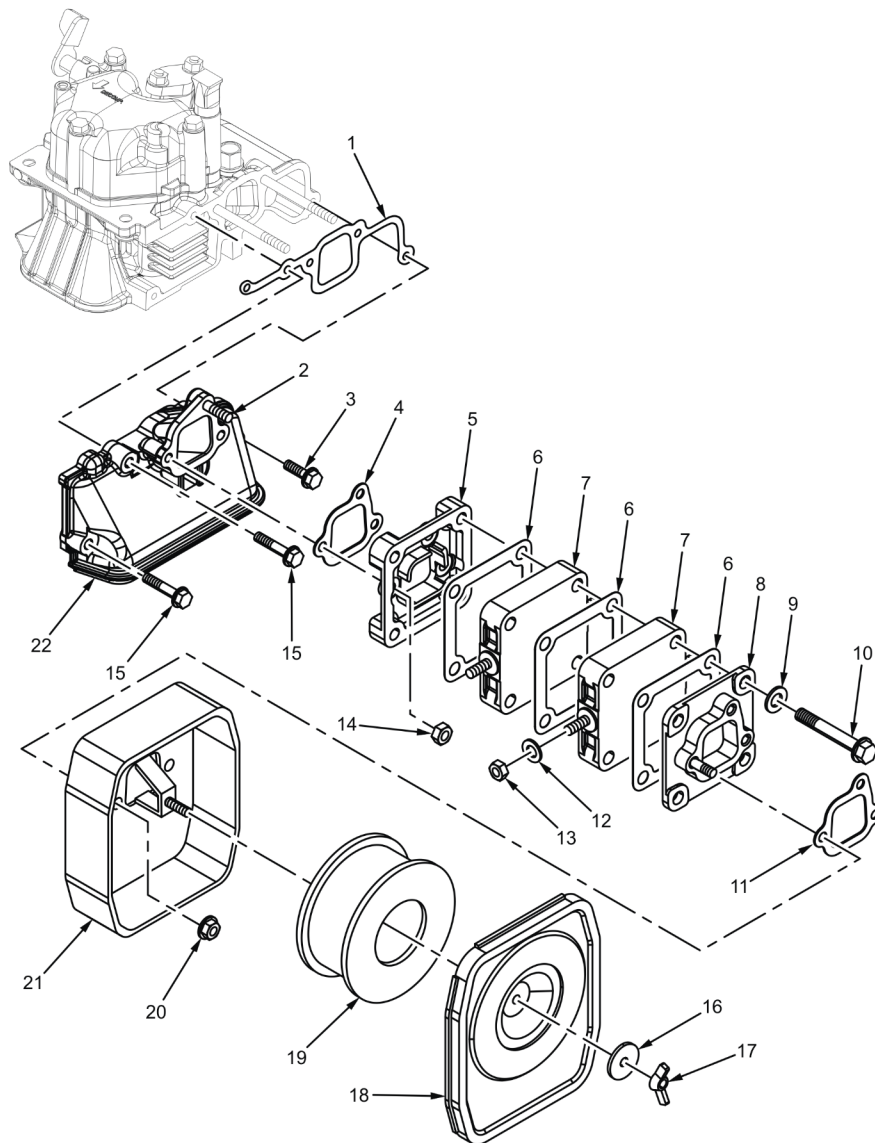
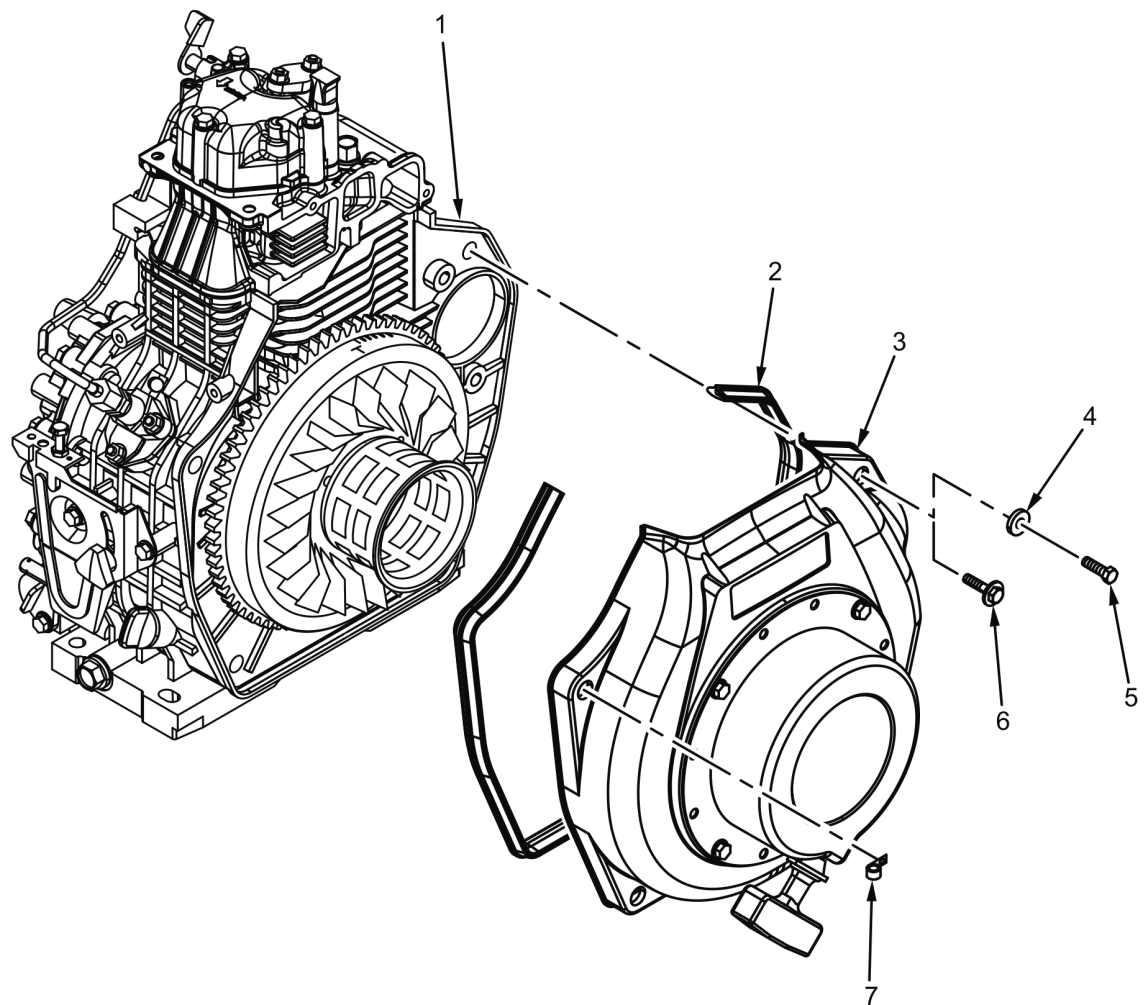


Figure 2. Air Cleaner Assembly L70N6EZ0T9EAFD.

INSTALL – CONTINUED**Figure 3. Flywheel Cover.****END OF TASK****REPAIR**

Disassemble as needed and replace defective component during reassembly.

END OF TASK**FOLLOW ON MAINTENANCE**

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**OIL FILTER: REMOVE, INSPECT, INSTALL, REPAIR**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)

Personnel Required

Power Equipment Specialist 91D (1)

Equipment Condition

Engine oil drained (WP 0006)

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)
Oil, Engine Lubricating (WP 0023, Table 1, Item 4)
O-Ring for L70AE-DEGFR (WP 0025, Table 1, Item 1)
O-Ring for L70N6EZ0T9EAFD (WP 0025, Table 1, Item 4)

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

REMOVE

1. Remove bolt (Figure 1, Item 4) from crankcase cover (Figure 1, Item 3).
2. Remove oil filter (Figure 1, Item 1) from crankcase cover (Figure 1, Item 3)
3. Remove and discard O-ring (Figure 1, Item 2)

REMOVE – CONTINUED

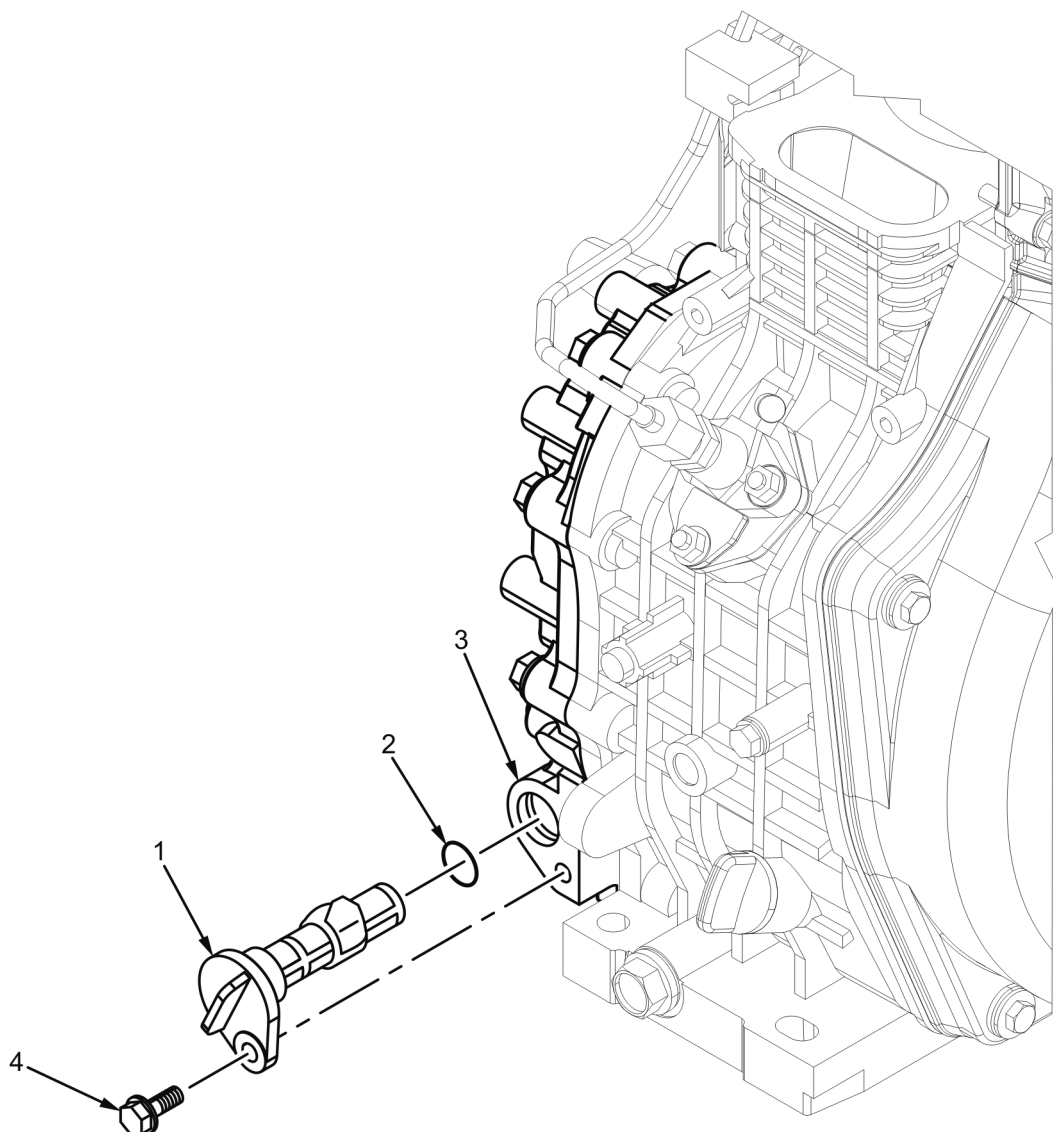


Figure 1. Oil Filter.

END OF TASK

INSPECT

WARNING

Cleaning solvents are flammable and toxic to eyes, skin, and respiratory tract. Some can cause an explosive atmosphere. Skin and eye protections are required when working in contact with cleaning solvents. Avoid prolonged or repeated contact. Work in

INSPECT – CONTINUED

well ventilated area only. Keep away from heat, sparks, and open flame. Do not smoke while using cleaning solvent. Use as recommended/directed by manufacturer. Failure to observe this warning can result in injury or death to personnel.

1. Inspect oil filter (Figure 1, Item 1) for obvious damage. Check filter's mesh material for damage. Clean out clogging dirt and residue with cleaning solvent and soft brush. Replace as required.
2. Inspect area around oil filter (Figure 1, Item 1) port for evidence of leakage. Clean area of dirt and accumulated grime using a clean rag.
3. Install oil filter.

END OF TASK**INSTALL**

1. Apply a light coat of lubricating oil to new O-ring (Figure 1, Item 2) and install O-ring onto oil filter (Figure 1, Item 1).
2. Slide oil filter (Figure 1, Item 1) into crankcase cover (Figure 1, Item 3) .
3. Install bolt (Figure 1, Item 4) to crankcase cover (Figure 1, Item 3) and secure.

END OF TASK**REPAIR**

Repair is limited to replacing broken component during removal and installation.

END OF TASK**FOLLOW ON MAINTENANCE**

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**INJECTION PUMP ASSEMBLY: REMOVE, INSPECT, ADJUST, INSTALL, REPAIR**

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)
Wrench, Torque, Dial, 3/8" Drive, 300 In-Lb (WP 0024, Table 1, Item 1)

Personnel Required

Power Equipment Specialist 91D (1)

Equipment Condition

Disconnect battery (TM 9-6115-639-13&P)

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)
Gloves (WP 0023, Table 1, Item 1)
Goggles (WP 0023, Table 1, Item 1)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

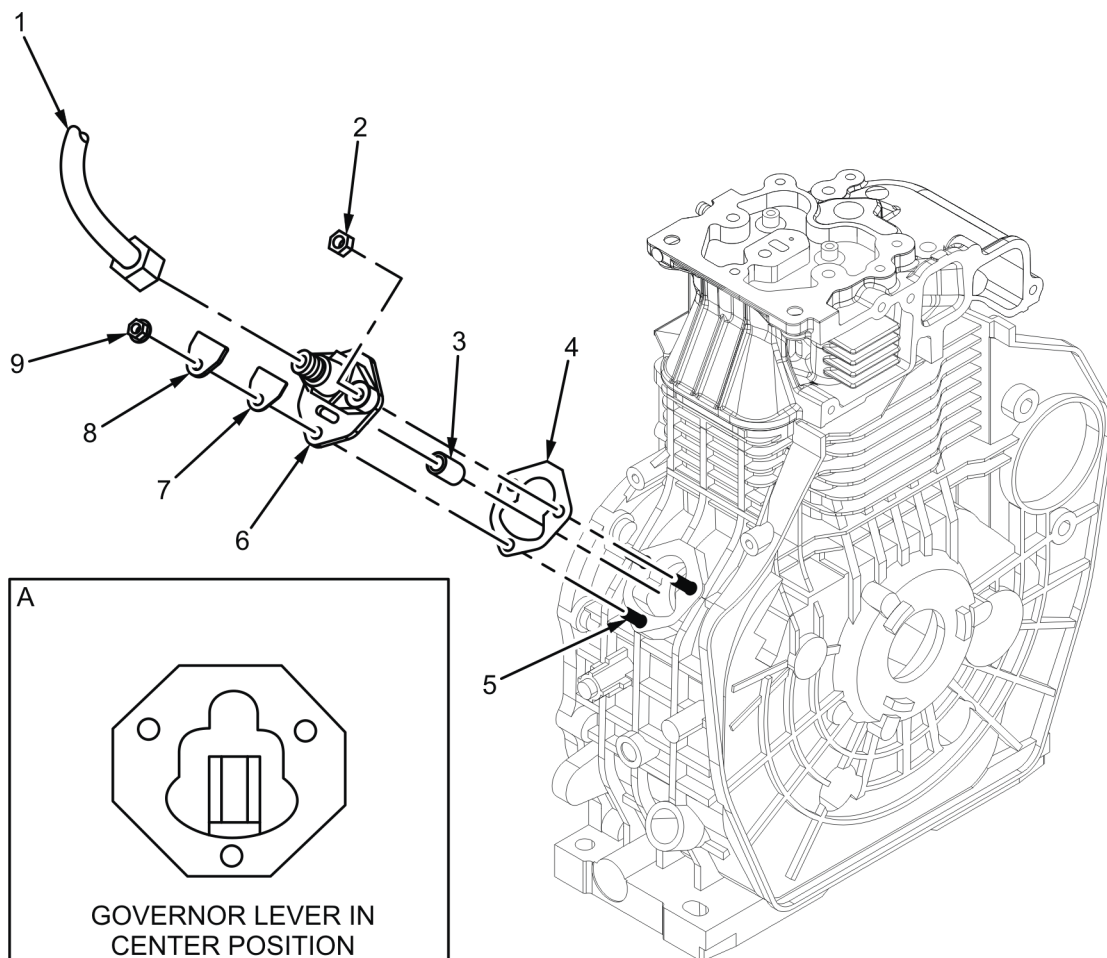
Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

WARNING

Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

REMOVE

1. Disconnect fuel pipe (Figure 1, Item 1) from fuel injection pump (Figure 1, Item 6).
2. Remove nut (Figure 1, Item 9), inspection cover (Figure 1, Item 8), and gasket (Figure 1, Item 7) from lower pump stud (Figure 1, Item 5).
3. Remove fuel injection pump (Figure 1, Item 6) from pump studs (Figure 1, Item 5) by removing two nuts (Figure 1, Item 2).
4. Remove shim(s) (Figure 1, Item 4). Note number of shims utilized.
5. Remove fuel tappet (Figure 1, Item 3) from engine crankcase.

**Figure 1. Fuel Injection Pump Removal.****END OF TASK****INSPECT**

1. Remove fuel injection pump (Figure 1, Item 6).
2. Inspect fuel pipe (Figure 1, Item 1) for cracks, kinks, and leaks.

INSPECT – CONTINUED

3. Inspect injection pump (Figure 1, Item 6) for crossed, stripped, or damaged threads. Replace if damaged.
4. Inspect fuel tappet (Figure 1, Item 3) for scores, pitting, or wear. Replace with pump housing assembly if damaged or worn.
5. Install fuel injection pump (Figure 1, Item 6).

END OF TASK**INSTALL**

1. Install fuel tappet (Figure 1, Item 3) into engine crankcase.
2. Install shim(s) (Figure 1, Item 4) onto injection pump studs (Figure 1, Item 5).

NOTE

Governor lever must be set so slot is in the center of opening in housing.

3. Install injection pump (Figure 1, Item 6) onto studs (Figure 1, Item 5), aligning tooth on control lever with slot on governor lever (Figure 1).
4. Install two nuts (Figure 1, Item 2) to studs (Figure 1, Item 5) and tighten to 7.2 to 8.7 foot-pounds (ft-lb) (100 to 120 kilogram-centimeters (kg-cm), using torque wrench.
5. Install gasket (Figure 1, Item 7), cover (Figure 1, Item 8), and nut (Figure 1, Item 9), and secure.
6. Adjust fuel injection timing before connecting fuel pipe (Figure 1, Item 1) to injection pump (Figure 1, Item 6), and secure.

END OF TASK**ADJUST**

1. Disconnect fuel pipe (Figure 2, Item 1) from injection pump (Figure 2, Item 13).
2. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Remove four bolts (Figure 2, Item 8) and flat washers (Figure 2, Item 7), securing flywheel housing assembly (Figure 2, Item 6), and p-clamp (Figure 2, Item 10), from cylinder block.
 - b. Remove four bolts (Figure 2, Item 9) securing flywheel housing assembly (Figure 2, Item 6), and p-clamp (Figure 2, Item 10), from cylinder block.
3. Remove flywheel housing seal (Figure 2, Item 5) with flywheel housing assembly (Figure 2, Item 6) from cylinder block.
4. Set governor speed control handle (Figure 2, Item 12) to START position.
5. Rotate flywheel (Figure 2, Item 11) in the clockwise direction until T position mark (Figure 2, Item 3) on flywheel matches V mark off line (Figure 2, Item 2) on cylinder body fin. This is the Top Dead Center (TDC) position. There should be some fuel coming out of the fuel injection pump. If fuel is not present, rotate the flywheel another revolution clockwise.
6. Turn flywheel (Figure 2, Item 11) counter-clockwise about 30 degrees from T position mark (Figure 2, Item 3).
7. Slowly turn flywheel (Figure 2, Item 11) clockwise until fuel flows from injection pump (Figure 2, Item 13), then stop rotation.

ADJUST – CONTINUED**NOTE**

Marks are 5 degrees apart. Flywheel should be 16 to 18 degrees before TDC position. Therefore, the V mark off line should be aligned between the third and fourth flywheel timing marks before the TDC position mark.

8. Use timing marks (Figure 2, Item 4) on flywheel (Figure 2, Item 11) to determine flywheel position.

NOTE

Fuel injection fuel flow should begin when flywheel is rotated 16 to 18 degrees from TDC position mark.

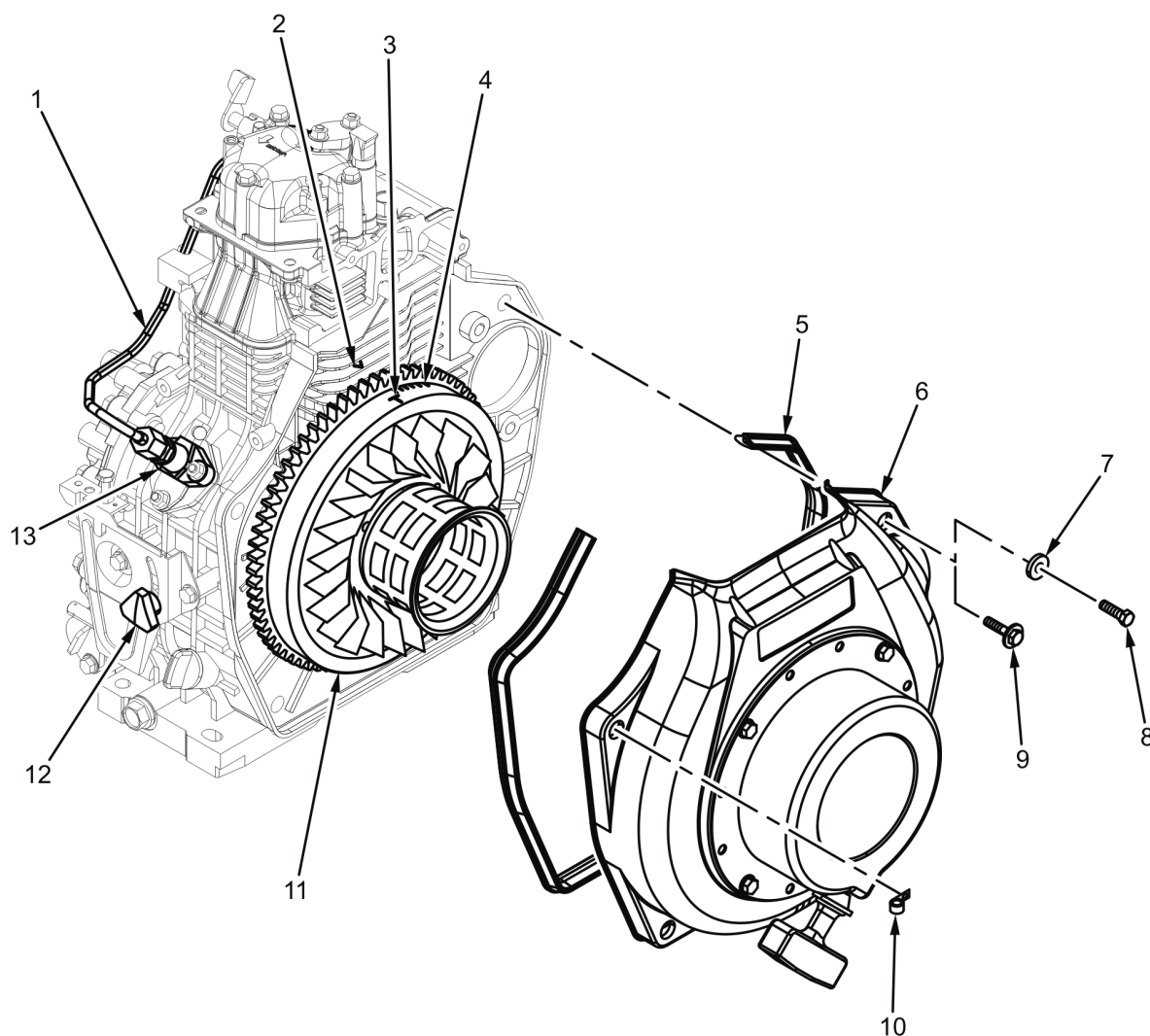
9. Repeat steps 7 through 9 two or three times to make sure reading is accurate.

NOTE

Injection timing can be adjusted by adding or removing fuel injection pump shims. Each 0.1 millimeter (mm) (0.0039 inch) shim changes timing by 1 degree.

10. If fuel is injected before a 16 degree rotation, remove fuel injection pump and add shim(s) (Figure 1, Item 4), then reinstall injection pump.
11. If fuel is not injected until after a 18 degree rotation, remove fuel injection pump and subtract shims, then reinstall injection pump.
12. Add or subtract shims (Figure 1, Item 4) as required and retest to ensure proper timing.

ADJUST – CONTINUED

**Figure 2. Fuel Injection Timing.**

13. Install fuel pipe (Figure 1, Item 1) onto injection pump (Figure 1, Item 6), and secure.
14. Install flywheel housing seal (Figure 2, Item 5) with flywheel housing assembly (Figure 2, Item 6) to cylinder block.
15. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Install four bolts (Figure 2, Item 8) and flat washers (Figure 2, Item 7) through flywheel housing assembly (Figure 2, Item 6), and p-clamp (Figure 2, Item 10), to cylinder block, and secure.
 - b. Install four bolts (Figure 2, Item 9) through flywheel housing assembly (Figure 2, Item 6), and p-clamp (Figure 2, Item 10), to cylinder block, and secure.

END OF TASK

FOLLOW ON MAINTENANCE

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

FUEL INJECTOR: REMOVE, REPLACE

INITIAL SETUP:**Tools and Special Tools**

Tool Kit, General Mechanic's Automotive (WP 0022, Table 2, Item 2)
 Wrench, Torque, Dial, 3/8" Drive, 300 In-Lb (WP 0024, Table 1, Item 1)

Materials/Parts - cont'd

O-Ring for Model L70N6EZ0T9EAFD (WP 0025, Table 1, Item 7)
 Gasket for Model L70N6EZ0T9EAFD (WP 0025, Table 1, Item 8)

Materials/Parts

Cloth, Cleaning (WP 0023, Table 1, Item 1)
 Solvent, Dry Cleaning (WP 0023, Table 1, Item 8)
 Gloves (WP 0023, Table 1, Item 1)
 Goggles (WP 0023, Table 1, Item 1)
 Oil, Engine, OE/HDO-40 (WP 0023, Table 1, Item 7)
 Gasket for Model L70AE-DEGFR (WP 0025, Table 1, Item 3)
 Cap, protection, dust and moisture seal for Model L70N6EZ0T9EAFD (WP 0025, Table 1, Item 2)
 O-Ring for Model L70AE-DEGFR (WP 0025, Table 1, Item 5)
 Gasket for Model L70AE-DEGFR (WP 0025, Table 1, Item 6)

Personnel Required

Power Equipment Specialist 91D (1)

References

WP 0014

Equipment Condition

Disconnect battery (TM 9-6115-639-13&P)

WARNING

REMOVE ALL JEWELRY BEFORE WORKING ON THE EQUIPMENT. Metal jewelry can conduct electricity. Remove metal jewelry before working on electrical system or components. Failure to observe this warning can result in severe personal injury from electric shock.

WARNING

Jewelry and other loose and dangling articles and clothing can be caught in moving parts. Remove jewelry and loose and dangling articles and clothing before working on the engine. Failure to observe this warning can result in injury to personnel.

WARNING

Use extreme caution when handling hot components. Wear protective gloves. Failure to observe this warning can result in injury to personnel.

WARNING

Diesel fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection are required when working in contact with diesel fuel. Avoid repeated or prolonged contact. Provide adequate ventilation. Keep away from sparks, open flames, or other sources of ignition. Do not splash fuel on hot components. Do not fuel generator set while it is operating. Do not overfill the tank. Ensure generator set is properly grounded before fueling. Ensure approved gloves and face shield are worn during handling. Operators are to wash exposed

skin and change chemical-soaked clothing promptly if exposed to fuel. Failure to comply with this warning could result in equipment damage due to potential fuel ignition and possible explosion could cause severe personal injury or death to personnel.

WARNING

Disconnect battery. Failure to do so will expose personnel to electrical shock/burn and or inadvertent start motor turning engine. Failure to observe this warning can result in injury to personnel.

REMOVE

1. Disconnect fuel supply line (Figure 1, Item 1) from fuel injector (Figure 1, Item 10).
2. Disconnect fuel return hose (Figure 1, Item 5) by loosening clamp (Figure 1, Item 4).
3. Remove two nuts (Figure 1, Item 3) and nozzle retainer (Figure 1, Item 2) from studs (Figure 1, Item 6).

CAUTION

When removing fuel injector, wrap it in a clean cloth to protect injector nozzle. Do not place nozzle tip directly onto a hard surface, as damage will result.

4. Carefully remove fuel injector (Figure 1, Item 10) from injection port in cylinder head.
5. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Remove injector spacer gasket (Figure 1, Item 9). Discard gasket.
 - b. Remove injector spacer (Figure 1, Item 8) and gasket (Figure 1, Item 7). Discard gasket.

REMOVE – CONTINUED

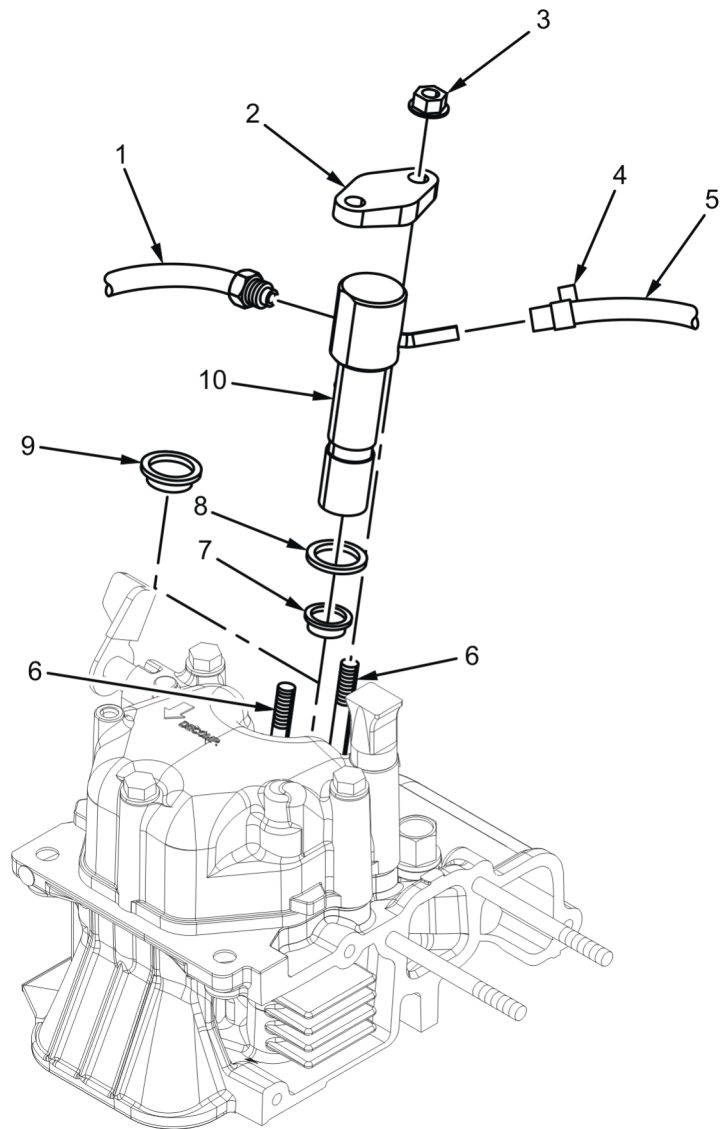


Figure 1. Fuel Injector.

END OF TASK

REPLACE

1. Perform the following step a. on model L70AE-DEGFR. Perform the following step b. on model L70N6EZ0T9EAFD.
 - a. Install new injector spacer gasket (Figure 1, Item 9) into cylinder head injector port. Ensure proper seating.
 - b. Install injector spacer (Figure 1, Item 8) and new gasket (Figure 1, Item 7) into cylinder head injector port. Ensure proper seating.

REPLACE – CONTINUED**CAUTION**

When installing fuel injector, use care to prevent damage to injector nozzle.

2. Carefully position and insert fuel injector (Figure 1, Item 10) into cylinder head. Ensure fuel pipe fitting is facing the correct direction.
3. Install nozzle retainer (Figure 1, Item 2) onto studs (Figure 1, Item 6).
4. Install nuts (Figure 1, Item 3) and torque to 84 to 108 inch-pounds (lb-in) (9.5 to 12 newton meters [Nm]).
5. Connect fuel return hose (Figure 1, Item 5) to fuel injector (Figure 1, Item 10) and tighten clamp (Figure 1, Item 4).
6. Connect fuel supply line (Figure 1, Item 1) to fuel injector (Figure 1, Item 10).

END OF TASK**FOLLOW ON MAINTENANCE**

Always check for proper operation IAW TM 9-6115-639-13&P.

END OF TASK**END OF WORK PACKAGE**

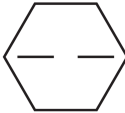
FIELD MAINTENANCE

TORQUE LIMITS

This Work Package (WP) lists torque ratings for fasteners used on the engine assembly. When torque values are called out in the maintenance procedures, those torques supersede the torques specified in this WP. Table 1 lists torque limits for standard fasteners installed dry. Table 2 provides formulas for converting the dry torque values to wet. Table 3 lists torque limits for standard metric fasteners installed dry.

TORQUE INSTRUCTIONS

Table 1. Torque Limits For Dry Fasteners.

SAE GRADE			0-1-2		3		5	
HEAD MARKINGS								
SIZE			TORQUE		TORQUE		TORQUE	
DIAMETER IN INCHES	THREADS PER INCH	MIL-LIMITERS	FT•LB	(N•M)	FT•LB	(N•M)	FT•LB	(N•M)
1/4	20	6.350	6	8	9	12	10	14
1/4	28	6.350	7	9	10	13	11	15
5/16	18	7.937	12	16	17	23	19	26
5/16	24	7.937	13	18	18	25	21	28
3/8	16	9.525	20	27	30	40	33	45
3/8	24	9.525	22	30	33	44	36	49
7/16	14	11.112	32	43	47	64	54	73
7/16	20	11.112	35	47	51	69	59	80
1/2	13	12.700	47	64	69	93	78	106
1/2	20	12.700	51	69	75	102	85	115
9/16	12	14.287	69	94	103	140	114	155
9/16	18	14.287	75	102	112	152	124	168
5/8	11	15.875	96	130	145	197	154	209
5/8	28	15.875	105	142	158	214	168	228
3/4	10	19.050	155	210	234	317	257	348
3/4	26	19.050	169	229	255	346	280	380
7/8	9	22.225	206	279	372	504	382	518
7/8	24	22.225	225	304	405	550	416	565
1	8	25.400	310	420	551	747	587	796
1	14	25.400	338	458	601	814	640	867

TORQUE INSTRUCTIONS – CONTINUED

Table 1. Torque Limits For Dry Fasteners. – Continued

SAE GRADE			0-1-2		3		5	
HEAD MARKINGS								
SIZE			TORQUE		TORQUE		TORQUE	
DIAMETER IN INCHES	THREADS PER INCH	MILLIMETERS	FT•LB	(N•M)	FT•LB	(N•M)	FT•LB	(N•M)
1/4	20	6.350	13	17	13	18	14	19
1/4	28	6.350	14	18	14	19	15	21
5/16	18	7.937	24	33	25	34	29	39
5/16	24	7.937	26	35	27	37	32	43
3/8	16	9.525	43	58	44	60	47	64
3/8	24	9.525	47	64	48	65	51	69
7/16	14	11.112	69	94	71	96	78	106
7/16	20	11.112	75	102	77	105	85	115
1/2	13	12.700	106	144	110	149	119	161
1/2	20	12.700	116	157	120	163	130	176
9/16	12	14.287	150	203	154	209	169	229
9/16	18	14.287	164	222	168	228	184	250
5/8	11	15.875	209	283	215	291	230	312
5/8	28	15.875	228	309	234	318	251	340
3/4	10	19.050	350	475	360	488	380	515
3/4	26	19.050	382	517	392	532	414	562
7/8	9	22.225	550	746	570	773	600	813
7/8	24	22.225	600	813	621	842	654	887
1	8	25.400	825	1119	840	1139	900	1220
1	14	25.400	899	1219	916	1241	981	1330

Table 2. Effect Of Lubrication On Torque.

	TORQUE RATING IN FOOT-POUNDS	
Lubricant	5/16-18 Thread/Inch	1/2-13 Thread/Inch
NO LUBE, Steel	29	121
Plated and cleaned	19 (66%)	90 (26%)

TORQUE INSTRUCTIONS – CONTINUED**Table 2. Effect Of Lubrication On Torque. – Continued**

	TORQUE RATING IN FOOT-POUNDS	
SAE 20 Oil	18 (38%)	87 (28%)
SAE 40 Oil	17 (41%)	83 (31%)
Plated and SAE 30	16 (45%)	79 (35%)
White Grease	16 (45%)	79 (35%)
White Moly Film	14 (52%)	66 (45%)
Graphite and Oil	13 (55%)	62 (49%)

Table 3. Torque Limits For Dry Fasteners (Metric).

										
			STANDARD 5D		STANDARD 8G		STANDARD 10K		STANDARD 12K	
DIAM- ETER IN MIL- LIME- TERS	COARSE THREAD PITCH	INCHES	FT•LB	(N•M)	FT•LB	(N•M)	FT•LB	(N•M)	FT•LB	(N•M)
6	1.00	0.2362	5	7	6	8	8	11	10	14
8	1.00	0.3150	10	14	16	22	22	30	27	37
10	1.25	0.3937	19	26	31	42	40	54	49	66
12	1.25	0.4624	34	46	54	73	70	95	86	117
14	1.25	0.5512	55	75	89	121	117	159	137	186
16	2.00	0.6299	83	113	132	179	175	237	208	282
18	2.00	0.7087	111	150	182	247	236	320	283	384
22	2.50	0.8771	182	247	284	385	394	534	464	629
24	3.00	0.9449	261	354	419	568	570	773	689	934

END OF WORK PACKAGE

CHAPTER 4

FIELD MAINTENANCE MANUAL SUPPORTING INFORMATION

REFERENCES

SCOPE

This Work Package (WP) lists all forms, pamphlets, field manuals, technical manuals, bulletins, army regulations, military specifications, and military standards referenced in this manual.

FORMS

DA Form 2028	Recommended Changes To Publications
DA Form 2404	Equipment Inspection And Maintenance Worksheet
DA Form 2407	Maintenance Request
MCO 4855.10	Quality Deficiency Reports
NAVMC 10772	Recommended Changes To Technical Publications
SF 368	Product Quality Deficiency Report

DA PAMPHLETS

DA PAM 738-750	The Army Maintenance Management System (TAMMS)
DA PAM 738-751	Functional Users Manual for the Maintenance Management System – Aviation
DA PAM 750-8	The Army Maintenance Management System (TAMMS)

ARMY REGULATIONS (AR)

AR 700-138	Army Logistics Readiness and Sustainability
AR 750-1	Army Materiel Maintenance Policy

FIELD MANUALS

TC 4-02.1	First Aid
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MILITARY STANDARDS

MIL-STD-129R	Military Marking For Shipment And Storage
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TECHNICAL MANUALS

TM 4700-15/1	Ground Equipment Record Procedures
TM 750-244-3	Procedures For Destruction Of Equipment To Prevent Enemy Use (Mobility Equipment Command)
TM 9-2815-257-24P	Field And Sustainment Maintenance Repair Parts And Special Tools List For Diesel Engine Assembly
TM 9-6115-639-13&P	Operator and Field Maintenance Manual Including Repair Parts and Special Tools List for 3kw Tactical Quiet Generator Set
TO 00-20	Aerospace Equipment Maintenance Inspection, Documentation, Policies, and Procedures

AIR FORCE INSTRUCTIONS (AFI)

AFI 21-101	Aircraft and Equipment Maintenance Management
AFI 33-201	Communications Security: Protected Distribution Systems (PDS)
AFI 38-401	Continuous Process Improvement (CPI)

COMMON TABLE OF ALLOWANCES (CTA)

CTA 50-909	Clothing and Individual Equipment
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COMMON TABLE OF ALLOWANCES (CTA) – CONTINUED

CTA 50-970	Field and Garrison Furnishings and Equipment
CTA 8-100	Army Medical Department Expendable/Durable Items

END OF WORK PACKAGE

INTRODUCTION FOR STANDARD TWO-LEVEL MAC

MAINTENANCE ALLOCATION CHART (MAC)**INTRODUCTION****The Army Maintenance System MAC**

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.

This MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Field - includes two subcolumns, Crew (C) and Maintainer (F).

Sustainment - includes two subcolumns, Below Depot (H) and Depot (D).

The maintenance to be performed at field and sustainment levels is described as follows:

1. Crew maintenance. The responsibility of a using organization to perform maintenance on its assigned equipment. It normally consists of inspecting, servicing, lubricating, adjusting, and replacing parts, minor assemblies, and subassemblies. The replace function for this level of maintenance is indicated by the letter "C" in the third position of the SMR code. A "C" appearing in the fourth position of the SMR code indicates complete repair is possible at the crew maintenance level.
2. Maintainer maintenance. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "F" appearing in the third position of the SMR code. An "F" appearing in the fourth position of the SMR code indicates complete repair is possible at the field maintenance level. Items are returned to the user after maintenance is performed at this level.
3. Below depot sustainment. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "H" appearing in the third position of the SMR code. An "H" appearing in the fourth position of the SMR code indicates complete repair is possible at the below depot sustainment maintenance level. Items are returned to the supply system after maintenance is performed at this level.
4. Depot sustainment. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "D" or "K" appearing in the third position of the SMR code. Depot sustainment maintenance can be performed by either depot personnel or contractor personnel. A "D" or "K" appearing in the fourth position of the SMR code indicates complete repair is possible at the depot sustainment maintenance level. Items are returned to the supply systems after maintenance is performed at this level.

The tools and test equipment requirements table (immediately following the MAC) lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks table (immediately following the tools and test equipment requirements) contains supplemental instructions and explanatory notes for a particular maintenance function.

Maintenance Functions

Maintenance functions are limited to and defined as follows:

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED

1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gaugings and evaluation of cannon tubes.
2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. The following are examples of service functions:
 - a. Unpack. To remove from packing box for service or when required for the performance of maintenance operations.
 - b. Repack. To return item to packing box after service and other maintenance operations.
 - c. Clean. To rid the item of contamination.
 - d. Touch up. To spot paint scratched or blistered surfaces.
 - e. Mark. To restore obliterated identification.
4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.
6. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
8. Paint (ammunition only). To prepare and spray color coats of paint so that the ammunition can be identified and protected. The color indicating primary use is applied, preferably, to the entire exterior surface as the background color of the item. Other markings are to be repainted as original so as to retain proper ammunition identification.
9. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
10. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

The following definitions are applicable to the "repair" maintenance function:

Services. Inspect, test, service, adjust, align, calibrate, and/or replace.

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

11. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
12. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

Explanation Of Columns In The Mac

Column (1) Group Number. Column (1) lists Functional Group Code (FGC) numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column (2) Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3) Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above).

Column (4) Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field:

C Crew maintenance

F Maintainer maintenance

Sustainment:

L Specialized Repair Activity (SRA)

H Below depot maintenance

D Depot maintenance

MAINTENANCE ALLOCATION CHART (MAC) – CONTINUED**NOTE**

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

Explanation Of Columns In The Tools And Test Equipment Requirements

Column (1) - Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) - Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) - Nomenclature. Name or identification of the tool or test equipment.

Column (4) - National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) - Tool Number. The manufacturer's part number.

Explanation Of Columns In The Remarks

Column (1) - Remarks Code. The code recorded in column (6) of the MAC.

Column (2) - Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

END OF WORK PACKAGE

STANDARD TWO-LEVEL MAC

Table 1. MAINTENANCE ALLOCATION CHART FOR DIESEL ENGINE.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
00	Engine, Diesel	Inspect Service	0.1	0.1 0.2			1, 2	A A, D
01	Recoil Starter Assembly	Inspect		0.1			2	E
		Service		0.2		2		
		Remove/Install		0.5		2		
		Repair		0.5		2		
02	Governor Mod- ule	Inspect		0.1			2	E
		Service		0.2		2		
		Remove/Install		0.5		2		
		Repair		0.5		2		
03	Cylinder Block	Inspect Repair	0.1	0.1 1.3			1, 2	A E
0301	Crankshaft	Inspect			0.5			E
		Remove/Install			1.0			
		Repair			0.5			
0302	Balancer Shaft Assembly	Inspect			0.4			E
		Remove/Install			1.5			
		Repair			1.0			
0303	Camshaft Assembly	Inspect			0.4			E
		Remove/Install			1.5			
		Repair			1.0			
0304	Piston And Connecting Rod	Inspect			0.5			A E
		Service			1.5			
		Remove/Install			1.5			
		Repair			0.5			
0305	Cylinder Head	Inspect		0.1			1, 2	E
		Remove/Install			1.5			
		Repair		1.3	1.5			

Table 1. MAINTENANCE ALLOCATION CHART FOR DIESEL ENGINE. – Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT REFERENCE CODE	(6) REMARKS CODE
			FIELD		SUSTAINMENT			
			CREW (C)	MAINTAINER (F)	BELOW DEPOT (H)	DEPOT (D)		
030501	Rocker Arm Assembly	Inspect		0.4			1, 2	A E
		Adjust		0.5				
		Remove/Install		1.0				
		Repair		1.3				
04	Air Cleaner Assembly	Inspect	0.1	0.1			1, 2 1, 2	A A, C E
		Service	0.1	0.3				
		Remove/Install		0.5				
		Repair		0.5				
05	Oil Filter	Inspect		0.4				A E
		Remove/Install		1.9				
		Repair		1.5				
06	Fuel Injection Assembly	Inspect	0.1	0.2				A E
		Adjust		0.5				
		Remove/Install		0.8				
		Repair		1.0				
0601	Fuel Injector Pump	Inspect	0.1	0.2				A E
		Remove/Install		0.8				
		Repair		1.0				
0602	Fuel Injector	Inspect	0.1	0.2				A E
		Adjust		0.5				
		Remove/Install		0.8				
		Repair		1.0				

Table 2. Tools And Test Equipment Requirements For Engine Assembly.

TOOLS OR TEST EQUIPMENT	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	F	Standard Automotive Tool Set	4910-01-490-6453	SC4910-95-A81
2	F	Tool Kit, General Mechanic's Automotive	5180-01-548-7634	5180-95-B48

Table 3. Remarks For Equipment Name.

REMARK CODE	REMARKS
A	Preventive Maintenance Checks and Services (PMCS).
B	Refer to TM 9-6115-639-13&P for removal and replacement of engine.
C	Service consists of air filter change.
D	Service in accordance with Lubrication Instructions.
E	Repair is limited to replacement of damaged parts.

END OF WORK PACKAGE

EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION**Scope**

This work package lists expendable and durable items that you will need to operate and maintain the engine assembly. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation Of Columns In The Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use Cleaning Compound (WP 0098, item 5)).

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item (F = Maintainer).

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1. Expendable and Durable Items List.

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
1	F	7920-01-338-3329	CLOTH, CLEANING RR1250 (09ZF6)	BG
2	F	9150-00-663-1770	GREASE, GENERAL PURPOSE 630AA (73219)	OZ
3	F	6850-01-160-3868	OIL, CORROSION INHIBITOR MIL-A-53009 (81349)	QT
4	F	9150-00-402-2372	OIL, ENGINE, OEA MIL-PRF-46167 (81349)	DR
5	F	9150-01-496-1939	OIL, ENGINE, OE/HDO-10 MIL-PRF-2104J	DR
6	F	9150-01-460-7518	OIL, ENGINE, OE/HDO-30 MIL-PRF-2104 (81349)	DR
7	F	9150-01-460-7956	OIL, ENGINE, OE/HDO-40 MIL-PRF-2104 (81349)	DR

Table 1. Expendable and Durable Items List. – Continued

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/(CAGEC)	(5) U/I
8	F	6850-00-264-9038	SOLVENT, CLEANING, DRY, TYPE II OR III AA59601-1F (58536)	CN

END OF WORK PACKAGE

TOOL IDENTIFICATION LIST

INTRODUCTION**Scope**

This work package lists all common tools and supplements and special tools/fixtures needed to maintain the Diesel Engine Assembly.

Explanation of Columns in the Tool Identification List

- Column (1) Item No. This number is assigned to the entry in the list and is referenced in the initial setup to identify the item (e.g., Extractor (WP 0090, item 32)).
- Column (2) Item Name. This column lists the item by noun nomenclature and other descriptive features (e.g., Gage, belt tension).
- Column (3) National Stock Number (NSN). This is the National Stock Number (NSN) assigned to the item; use it to requisition the item.
- Column (4) Part Number/(CAGEC). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity) which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items. The manufacturer's Commercial and Government Entity Code (CAGEC) is also included.
- Column (5) Reference. This column identifies the authorizing supply catalog or RPSTL for items listed in this work package.

Table 1. Tool Identification List.

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER (NSN)	(4) PART NUMBER/ (CAGEC)	(5) REFERENCE
1	Wrench, Torque, Dial, 3/8" Drive, 300 In-Lb	5120-00-776-1841	KTC-S0987 (00NS2)	Tool Set

END OF WORK PACKAGE

MANDATORY REPLACEMENT PARTS LIST

MANDATORY REPLACEMENT PARTS LIST

This work package includes a list of all mandatory replacement parts referenced in the task initial setups and procedures. These are items that must be replaced during maintenance whether they have failed or not. This includes items based on usage intervals such as miles, time, rounds fired, etc.

Table 1. Mandatory Replacement Parts List.

ITEM NO.	PART NUMBER/ (CAGEC)	NATIONAL STOCK NUMBER (NSN)	NOMENCLATURE	QTY
1	103338-32570 (0AK42)	5331-01-324-8279	O-RING	1
2	114240-11450 (0AK42)	5340-01-624-0242	CAP, PROTECTIVE, DUST AND MOISTURE SEAL	1
3	114250-11460 (0AK42)	5330-01-326-8021	GASKET	1
4	114299-32570 (0AK42)	5331-01-545-0009	O-RING	1
5	114350-01380 (0AK42)	5331-01-446-0712	O-RING	1
6	114395-01331 (0AK42)	5330-01-623-5800	GASKET	1
7	114399-01380 (0AK42)	5331-01-601-9047	O-RING	1
8	114870-01340 (0AK42)	5330-01-477-4033	GASKET	1

END OF WORK PACKAGE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA					Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).		DATE 21 Nov 2011
TO: (Forward to proponent of publication or form) (Include ZIP Code) Commander, U.S. Army Communications-Electronics Command, 6001 Combat Drive, ATTN: AMSEL-LCL-ECM, Aberdeen Proving Ground, MD 21005-1846					FROM: (Activity and location) (Include ZIP Code) Jane Q. Doe, SFC 1234 Any Street Anytown, AL 34565		
PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 11-1234-567-14				DATE 15 Jan 2011		TITLE Operator, Field and Sustainment Support Maintenance Manual for Radio, AN/ABC-123	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
1	WP0005 PG 3		2			Test or Corrective Action... should identify a different WP number.	
TYPED NAME, GRADE OR TITLE Jane Q. Doe, SFC				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 123-4567		SIGNATURE	

TO: (Forward to proponent of publication or form) (Include ZIP Code)				FROM: (Activity and location) (Include ZIP Code)			DATE	
PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS								
PUBLICATION/FORM NUMBER				DATE			TITLE	
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
EXAMPLE								
PART III - REMARKS (Use space for remarks, comments, questions, or suggestions for improvement of publications and blank sheets may be used if more space is needed.)								
TYPED NAME, GRADE OR TITLE			TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE		

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
TO: (Forward to proponent of publication or form) (Include ZIP Code)						FROM: (Activity and location) (Include ZIP Code)	
PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER				DATE		TITLE	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
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TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

31 August 2018

By Order of the Secretary of the Army:

MARK A. MILLEY
General, United States Army
Chief of Staff

Official:



MARK F. AVERILL
Acting Administrative Assistant
to the Secretary of the Army
1719251

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